

# The Chemical Age

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## Notes and Comments

### Proper Conditions and Safeguards

OF all the subjects of importance to the chemical industry, there is perhaps none that has been so prominently before the public, both lay and technical, during the past weeks as that of research. There are so many advantages which accrue from research undertaken *under proper conditions and safeguards*, that it is nothing less than an industrial calamity when research is undertaken under false conditions and, being foredoomed to failure, brings discredit both upon those engaged in it and also upon the whole idea of research. Many of the essential conditions and safeguards may be gathered from recent public pronouncements. Dr. Pickard has referred to heads of businesses who believe that by engaging a few research chemists, and providing them with apparatus, he can guarantee a constant stream of dividends as the result of their work. Professor Gibbs and Dr. A. J. V. Underwood, whose letter to "The Times" we printed last week, also stress the same point which is evidently so prevalent as to constitute a real danger to industrial research in this country. There are few things more devastating in their results than shattered hopes! These authorities and Mr. West also stress the danger of failure due to unsuitable personnel. Professor Gibbs and his colleagues are particularly pertinent, in our opinion, when they mention failure due to "a lack of industrial training and outlook in the members of the research staff." University professors, who are genuinely anxious to place their graduates in industry, are too apt to regard the industrial research laboratories as their lawful prey. It is false economy to engage a preponderance of possibly brilliant young academically trained research chemists to conduct industrial research. It is better to have a greater proportion of those with industrial experience. We are in whole-hearted agreement with Professor Gibbs and Dr. Underwood, when they declare that a moderate expenditure with a well-chosen staff will generally produce more valuable results than a lavish expenditure with an unsuitable staff.

### The Attitude of the Manufacturer

THERE is, of course, the attitude of the manufacturer to consider. In England industries based upon science are at a disadvantage because the greater part of British industry is controlled by boards of directors, who, while they are like John Gilpin, "citizens of credit and renown," like him have but little, if any knowledge of the horse they bestride. Is it not time that more scientific men were put upon our boards of directors? We gave it as our opinion last week that there is a definite case for compelling firms to enter their

industrial research organisation. We believe that this necessity would not arise if every firm were compelled to have at least one technical man upon the board. Finance, management, and the rest are no more important matters in the prosecution of many of our industries than is the technical and scientific side of the work; yet this is too often left virtually unrepresented.

Money expended upon research should be regarded as a long-term investment, the ultimate return from which is quite incalculable. Research demands intense concentration from those engaged therein. This concentration is not, as in many professions, confined to the hour actually spent in the office or laboratory, but must be continued throughout what is normally a time for relaxation. This does not mean, of course, that the research chemist works 24 hours a day, but it does mean that the mind of the research worker must be free from worries and interference in order that his subconscious mind may concentrate on the problems under investigation. Days, weeks, months, may pass without any solution to the problem appearing; then one day comes inspiration. It is too seldom realised that this is not a chance inspiration but that the solution would never have come but for the intense concentration of the preceding months. If the research chemist is to be able to give this essential intense concentration, he must be guaranteed two things. One of these is an adequate salary so that his mind is free from the strain of "making ends meet."

### Government Assistance in Private Research

IT is not conducive to good work for a research man to be looking (a) for a better job, (b) for a second source of income. The second necessity is perhaps even more important. If investigation be stopped when a research has proceeded for a few months, the chemist is wondering how long his job will last—a most disturbing state of affairs—and when it is again decided to undertake the research the former workers will have left and the new ones will have to start the investigation from the beginning—a highly expensive proceeding for the manufacturer. Research in this country is all too frequently a matter of spasmodic effort. With a strange lack of foresight many industrial concerns in times of depression economise by reducing their expenditure on what they regard as non-productive services. By some extraordinary mental process the research department, formed to keep the concern in the van-guard of progress, to devise new processes, to invent new plant, comes to be regarded as a "non-productive service."

Successful research not only benefits the individual

concern but must also increase the general prosperity of the country. There is something to be said for the suggestion recently made by Mr. H. W. J. Stone, secretary of the Association of Scientific Workers, that industrial laboratories should be afforded the facilities now given to factories under the de-rating act. It is not sufficient for the Government to finance the national research laboratories, because the work done in those laboratories, whilst of the utmost value nationally, can never take the place of the individual industrial laboratory. Many of our troubles are due to the mistaken idea, emphasised by Professor Gibbs and Dr. Underwood, that a scientist, because he is a scientist, is unfitted for the higher industrial and administrative posts. We have heard the thesis propounded by works engineers, by men of business, and by all the other host of "practical" men. The chemist, they say, is restricted in his outlook; his horizon is bounded by the test-tube; he knows nothing of the world; the management of workmen is quite beyond him for he never mixes with them as the engineer does. Of a certain type of chemist this is true—a type of chemist, we hope, that is disappearing. But to brand all the eminent men of science, and particularly of industrial science, as dreamers unfit for high posts in the world of affairs is to neglect all the experience of other nations, and particularly of our greatest competitor, the great German chemical industry.

### **Work of the Fuel Research Board**

MUCH of the work of the Fuel Research Board, to which we made reference last week, has a deep interest for the chemical industry. All industry, and perhaps the chemical industry quite as much as others, lives by continually developing something new. The world as we know it differs from the more leisurely times of our ancestors chiefly in the increased fertility for invention and discovery. Mankind to-day is never satisfied with a condition of stability, and especially is this so in industry. The chemical industry will, therefore, scan the pages of the Fuel Research Board's report more particularly to descry possible future developments. Nor will it be disappointed. The most spectacular work, in the popular sense, is the development of low temperature carbonisation. Unquestionably there is a definite market for a coke similar to low temperature coke and possessing a volatile matter content of the order of 8 to 10 per cent. The difficulty in this connection has been partly the lack of a satisfactory technical process and partly because the processes which were reasonably successful technically, failed economically. The Fuel Research Board, having made an admittedly expensive experiment when it allowed the Government to spend £100,000 in financing the Richmond retorts erected for the Gas Light and Coke Co., has now come to the conclusion that retorts must be constructed of refractory material. The Board should have listened to the advice of the high temperature technologists and should have experimented with a brick retort before involving the nation in so much expense.

Something more must be done with the only product of value—tar—than to sell it for burning in crude state for 1d. per gallon. There is ample evidence that a new industry is on its way, that of the working-up of low temperature tar. The collaboration of the

Fuel Research Board with the National Chemical Laboratory has been particularly happy in this respect, since the chemical laboratory has shown the proper way to separate the constituents of the tar from one another and to work up the several groups of compounds into useful products, whilst the Fuel Research Board has experimented with the hydrogenation of these products. Both these lines of research work are being continued and are being further developed.

### **A New Industry Foreseen**

IMMEDIATE success cannot be hoped for, but it is possible to foresee a stabilised and, so far as is possible at this stage, a standardised industry for the preparation of commercial products from low temperature tar. We called attention on February 11 to another possibility, that of working up the gases evolved from low temperature carbonisation into products of value as is being done for high temperature gases in Belgium. We commend this idea to the Fuel Research Board for future consideration. If the solid smokeless fuel industry is to be firmly established no possible source of income must remain neglected. Researches of this nature, attended by considerable expense and extending over many years, could not be undertaken by many private individuals or firms to-day.

In view of the very large quantities of petroleum products imported into this country the work being done upon hydrogenation of coal must receive particular attention. The coal industry will be particularly interested because it does not object to oil, as oil, but to the fact that the imported oil is displacing home-produced coal. Oil produced from coal is quite another thing. Imperial Chemical Industries, Ltd., conducted rather an elaborate practical experiment upon hydrogenation and abandoned the process forthwith as not being economically sound. The Fuel Research Board is continuing its experiments and may possibly arrive at a more economical process. Therein lies the borderline between the research that can be undertaken by even a large private firm and by a national body.

### **The Pulverised Fuel Burner**

THE new pulverised fuel burner will prove of the very highest utility if the very fine grinding of the coal now necessary can be avoided. The value of the experiments to the coal industry and to shipping will be immediately evident, but the experiments are equally valuable to all who burn coal; there is proceeding—slowly perhaps, but surely—a revolution in coal burning practice, and in the new order pulverised fuel will be important as soon as some of the present disabilities are overcome. The use of larger particles of coal will do much in this direction. The experiments on colloidal fuel are also important and are of interest to chemists since the stabilisation of an oil-coal suspension is a purely chemical problem. Many buildings are to-day being equipped to burn oil. This importation of oil could be avoided if oil-coal suspensions could be stabilised for use by the general public, and if the oil could be produced at home from coal. The work of the Fuel Research Board cannot be neglected by chemists, since it contains much of promise for new chemical industries and for new outlets for the activities of the chemist.

## Insoluble Azo-Dyestuffs Containing Sulphur New Products of French Manufacture

THERE are several methods of applying insoluble azo colours in one stage. The most important are those which utilise the Rapid Fast, Rapidojen and Rapidazol colours, described in THE CHEMICAL AGE, December 24, 1932, p. 597; Imperial Chemical Industries, Ltd., introduced the Solazol colours, which are insoluble azo colours applied in the form of sulphuric esters, to be subsequently hydrolysed (THE CHEMICAL AGE, April 9, 1932, page 22). The Société Anonyme des Matières Colorantes et Produits Chimiques de Saint-Denis have now taken out three patents, two of which cover the manufacture of insoluble azo-dyestuffs containing sulphur, whilst the third covers the application of these products to the textile fibres from dilute solutions of sodium sulphide. These products apparently have not been marketed as yet in this country, but their underlying principle seems so sound that it is worth drawing attention to it.

### Method of Manufacture

Müller ("Zeit. Farben-Industrie," 1906, 5, 307) described a dyestuff made by coupling tetrazotised 4: 4'-diamino-diphenyl disulphide (para-dithio-aniline) with  $\beta$ -naphthalamine; he indicated that this dyestuff is insufficiently soluble in a solution of sodium sulphide to be of any interest. He seems to have been lucky in the choice of his passive component, for Brit. Pat. 365,937 of the St. Denis Co. claims the use of dyestuffs obtained by coupling tetrazotised 4: 4'-diamino-diphenyl disulphide with non-sulphonated azo-components other than  $\beta$ -naphthylamine. They have good solubility in sodium sulphide solutions and are absorbed from such solutions by cotton, etc. The non-sulphonated azo-components may contain a disulphide group such as bis-(2-hydroxy-naphthyl-6)-disulphide or the dithioanilide of 2: 3-hydroxy naphthoic acid, or a tri-sulphide group, such as the trisulphide of  $\alpha$ -naphthol. As an example, 12.4 parts of para-dithio-aniline are dissolved in 36 parts of hydrochloric acid of 22° Bé and 300 parts of water. To the solution so obtained there are added at ordinary temperature 70 parts of a 10 per cent. solution of sodium nitrite. The whole is then introduced into 300 parts of an aqueous alcoholic (50 per cent.) solution containing 70 parts of caustic soda solution of 40° Bé and 32 parts of 2: 3-hydroxy-naphthoic acid para-dithio-anilide. The dyestuff separates in the form of a dark red precipitate, and is freely soluble in sodium sulphide solution.

Table I indicates the properties of a number of dyestuffs made in accordance with this invention.

Brit. Pat. 370,705, claims the coupling of two molecular proportions of a diazotised ortho-aminophenol with one molecular proportion of an azo-component containing at least one disulphide or trisulphide group. The dyestuffs are absorbed by cotton from a sulphide bath, and the dyeing may be treated with metallic salts to improve the fastness. The properties of these dyestuffs are tabulated in Table II.

### Dyeing in a Sulphide Bath

It is interesting to compare the products when the passive component is 2: 3-hydroxy-naphthoic acid para-para'-dithio-anilide, with the present day insoluble azo colours using Naphthol AS. The former product is made by the usual method, a suspension of 7 parts of 2: 3-hydroxynaphthoic acid and 5 parts of 4: 4'-dithioaniline in anhydrous toluene being heated to 60 to 70° C. Three parts of phosphorus trichloride are then added in small quantities, care being taken to stir the reaction mixture, whereupon the whole is heated to boiling whilst stirring is continued. When hydrochloric acid is no longer evolved the whole is rendered alkaline by the addition of sodium carbonate and the toluene is removed by distillation with steam. On acidification, 2: 3-hydroxy-naphthoic acid dithioanilide is precipitated. It is sparingly soluble in alcohol and boiling acetic acid but is soluble in caustic soda solution and in warm sodium carbonate solution.

The application of these products from a dilute sodium sulphide bath require care, since at elevated temperatures the azo-linkage undergoes reduction by the sulphide which itself becomes oxidised. If the dyeing is conducted below 65° C. satisfactory results are obtained; this forms the subject mat-

ter of Brit. Pat. 377,348. Thus the dyestuff from 4: 4'-diamino-2: 2'-dinitro-diphenyl disulphide with  $\beta$ -naphthol yields an intense orange shade when dyeing is carried out at the ordinary temperature, whilst when dyeing is conducted in the manner usual in the case of sulphur dyestuffs, there is obtained a weak bluish-red shade. However, the latter shade may also be obtained, but in greater depth, when dyeing is conducted at ordinary temperature, if the dyestuff is allowed to remain for a long time in solution, in presence of a sulphide either before or during the dyeing operation. The dyeings are subsequently oxidised, and may be after-treated with solutions of metallic salts. The products are applicable not only for dyeing vegetable fibres, but for dyeing fibres of regenerated cellulose, cellulose ethers or cellulose esters.

TABLE I.

| Tetrazotised para-Dithioaniline coupled with 2 molecular proportions of | Colour of Dry Powder. | Colour of Dilute Sodium Sulphide Solution |
|---|-----------------------|---|
| 1-phenyl-3-methyl-5-pyrazolone  | yellow-orange         | yellow.                                   |
| $\alpha$ -naphthol .. ..  | black                 | violet-red.                               |
| $\beta$ -naphthol .. ..   | red*                  | red.                                      |
| 2: 7-dioxynaphthalene ..  | purple-black          | violet-red.                               |
| $\alpha$ -naphthylamine .. ..   | black                 | brown-yellow.                             |
| meta-phenylene diamine ..   | black                 | greenish-yellow.                          |
| bis-(2-hydroxynaphthyl-6-) disulphide .. ..                             | black                 | brown-purple.                             |
| $\beta$ -oxynaphthoic acid para-dithioanilide .. ..                     | dark red              | orange-brown.                             |
| trisulphide of $\alpha$ -naphthol .. ..                                 | black                 | violet.                                   |

TABLE II.

| Diazo Compound of     | Azo Component.                               | Colour of Sodium Sulphide Solution. |
|-----------------------|--|-------------------------------------|
| 4-chlor-2-aminophenol | 2-hydroxy-naphthoic acid para-dithio-anilide | red.                                |
| 4-nitro-2-aminophenol | Ditto.                                       | violet.                             |
| picramic acid ..      | Ditto.                                       | violet.                             |
| ortho-aminophenol ..  | bis-(2-hydroxynaphthyl-6-) disulphide        | blue.                               |
| 4-chlor-2-aminophenol | trisulphide of $\alpha$ -naphthol            | red.                                |

## The Institute of Physics

### First Meeting of the Manchester Section

THE recently formed Manchester and District Section of the Institute of Physics began its activities on February 10, with a lecture on "Research from an Industrial Point of View" by Mr. A. P. M. Fleming, manager of the research and education departments of the Metropolitan-Vickers Electrical Co., Ltd. Professor W. L. Bragg presided.

Mr. Fleming first outlined briefly the function of industry; he then discussed the function of research both in regard to the efficiency of industrial operations and with respect to the discovery and application of new knowledge. The lecturer strongly urged the necessity for discovering new outlets for industrial activity and the important part which research played in finding such outlets and in building up new industries. He enlarged upon the various steps in the development of an original idea, from its inception up to commercial production. Each step was illustrated by reference to existing industries. The lecture concluded with a reference to the intermediary function of research organisations between the factory and the expanding field of knowledge due to new discoveries.

Prior to the lecture the rules for the regulation of the section were adopted, and the following committee was elected: Professor W. L. Bragg (chairman), Dr. H. Lowery (hon. secretary), Mr. E. H. W. Banner, Mr. W. Jackson, Mr. F. Oldham, Mr. S. W. Redfearn, Dr. F. C. Toy, and Dr. R. S. Willows.

## Rubber Latex in Industry

### New Applications and Anticipated Uses

IN the four years which have elapsed since the Rubber Growers' Association first issued its book on "Rubber Latex,"\* great strides have been made in the technical applications of this material. A second and revised edition of this book has therefore been published, which deals, *inter alia*, with the properties, composition, coagulation, concentration, manipulation and compounding of latex and latex pastes, and its stabilisation for industrial purposes. The vulcanisation of latex and latex products, dipping and electro-deposition and the marketing and applications of latex are also discussed, whilst a final chapter deals with over 500 recent British patents testifying to the growing importance which is attached to the direct application of latex.

#### Impregnation of Cloth

If cloth is to be impregnated with latex an immersion process is used, such, for instance, as is employed in the "tub-sizing" of paper. The cloth in such a case is led under guide

nets, jute sacking, and bags for cement and other finely ground materials, wool packs and even tarpaulins. The rubber fills or partially fills the interstices, rendering the material substantially waterproof and protecting the valuable contents from dirt and contamination. The main drawback is the cost, but there is an opening for a combination of latex cheapened by the addition of other substances such as oils, waxes, paraffins, bitumens, cellulose and mineral fillers.

By spraying latex on to moulds or formers of the desired shape articles could be manufactured readily and cheaply. This method, however, has not found commercial application up to the present owing to technical difficulties, and to the greater development of the dipping process, which gives similar results. The possibility of spraying and coating sheet metal for the construction of rubber-lined plant does not appear to have received much consideration; but the difficulty here is the anchorage of the rubber film to the metal. A recent proposal to this end utilises haemoglobin or the "red



*By courtesy of Dunlop Rubber Co., Ltd.*

Manufacture of Sponge Rubber Automobile Seats : Filing the Moulds

rollers immersed in the latex, so that it is conducted through a bath of the liquid. As it leaves the latex the cloth passes between a pair of rollers which squeeze out excess of latex, which returns to the bath. Such an arrangement coats both sides of the cloth and is generally more suited for impregnating a textile material with rubber than applying a coating. It is thus used for impregnating "cord," the cotton yarn used in building up the cover of a motor tyre. The process can, however, be modified by adjusting the position of the guide rollers so that the surface of the fabric just touches the surface of the latex in the bath. Alternatively the well-known device may be adopted of interposing a roller between the latex and the cloth. The roller moves freely with the cloth, becoming wetted on the underside as it revolves in the latex and transferring the latex to the underside of the cloth with which it comes in contact.

Other materials which may be coated or impregnated with rubber latex or latex mixtures include paper, boards, fishing

end" of ox blood, separated by means of a centrifuge (Brit. Pat. 309,168). The mixture of latex and haemoglobin is applied to the sheet metal and on reaching a temperature of 150° F. the protein of the haemoglobin becomes insoluble, and the insoluble but rubber-containing film serves as a first coat for the rubber layer subsequently applied.

#### Manufacture of Sponge Rubber

In recent years latex processes have been adapted to the manufacture of sponge rubber. The usual method of manufacturing this material consists of masticating the rubber until it becomes very plastic; that is to say, until its elasticity or "nerve" has been completely destroyed. The rest of the process bears a very close analogy to cake making. A blowing agent, for example, sodium bicarbonate, is introduced into the masticated rubber together with vulcanising ingredients, fillers, softeners, etc. It is usual to employ a comparatively large proportion of the latter in order to produce a soft dough which will "blow" easily. The mixed compound is then vulcanised in a mould in a steam-heated platen press. The piece of mixed compound put into the mould is

\* "Rubber Latex," by Henry P. Stevens and W. H. Stevens. Issued by The Rubber Growers' Association, London. 1933.

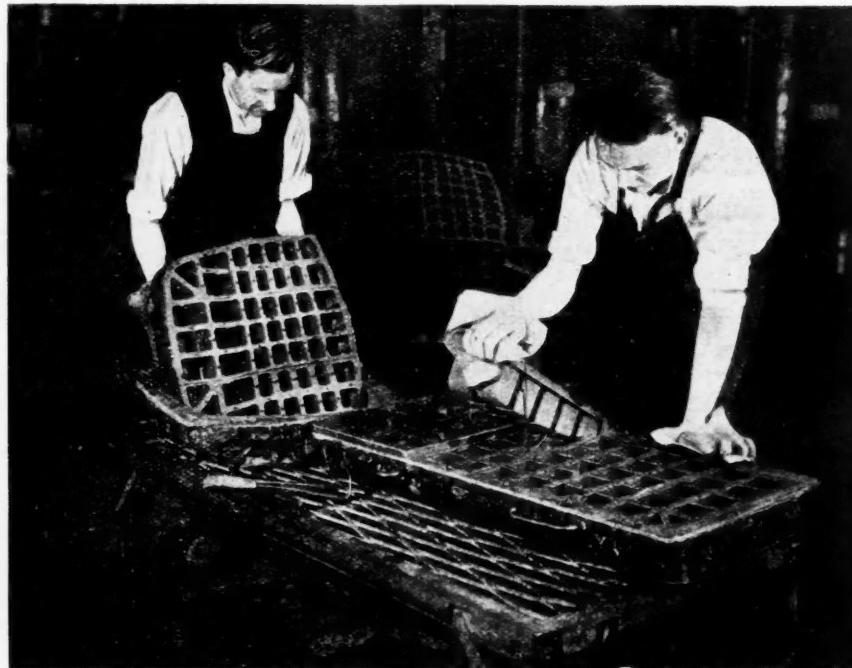
always much smaller than the internal cavity of the mould, which represents the article to be manufactured. As it is heated the rubber "blows," expands, and finally fills the whole mould with a porous rubber which is "set" by continuing the heating and thus vulcanising the sponge structure. The vulcanised sponge rubber can then be removed from the mould on opening. This method is far from simple in practice, for however expert the compounder or the operator, the type of porosity produced is difficult to control. In addition, the high proportion of softener and extensive masticating that are necessary give rise to an inferior quality of vulcanised rubber. Sponge rubbers are frequently lacking in strength and durability; in addition, there is a limitation to the sizes and thickness of sheets of sponge produced by this method.

### Forming a Porous Coagulum

The process of making sponge rubber from latex (Brit. Pat. 332,525, 332,526 and 365,546) avoids the last-named disadvantages, and in common with all latex process it eliminates the masticating treatment which damages the rubber. In brief the process consists of whipping up a compounded latex

homogeneous sponge by setting one layer of froth before superimposing a second, third, fourth, and so on, the composition and porosity of each layer being varied at will. The froth can also be spread on a canvas or fabric backing where additional support is desirable for thin layers, *e.g.*, to act as an underfelt.

There is no doubt that the regulated use of a small proportion of latex improves the finish of high-grade paper, the pen sliding more easily over latex paper, and the resistance to tearing when the paper is creased ("folding number") being also improved. Latex notepaper is at present being made by one or two mills in this country. The use of the paper-making machine for the production of rubber products also seems to have been revived (Brit. Pat. 375,845). It is claimed that superior results are obtained by adding the coagulant, that is the alum, to the pulp before the latex. In this way there is said to be less tendency for the fibres to agglomerate, which necessitates further treatment in the beating machine to obtain a uniform product. Such a procedure is contrary to usual practice not only with latex but with rosin size, which, like latex, is an emulsion or suspension in a watery liquor, but of rosin particles instead of rubber. The rosin,



*By courtesy of Dunlop Rubber Co. Ltd.*

Manufacture of Sponge Rubber Automobile Seats : Opening the Moulds

mixing to produce a foam. The latex is first treated with the ordinary vulcanising and compounding ingredients so that the ultimate foam-like product can be vulcanised. In addition there is added an emulsifying agent, such as soap solution, in order to stabilise the foam, and a "setting agent," which is a coagulant having a delayed action, to set the foam. The conditions are adjusted so that the foam produced by whipping or blowing the latex mixture is stabilised in this condition, *i.e.*, the bubbles do not burst or subside until the setting agent has coagulated the whole to a porous coagulum. The latter can then be vulcanised and dried to give a sponge rubber. By adjusting the proportion of setting agent, temperature, etc., the time in which the latex froth will set can be readily controlled. The accompanying illustrations show stages in the manufacture of motor car seats and upholstery by this method. An essential feature of the process is that pieces of sponge rubber of any dimension or thickness can be produced without any difficulty, whereas by the old methods there were considerable limitations due to the inherent difficulties in manufacturing thick sponge rubber sheets uniformly vulcanised. In addition, different types of sponge rubber can be superimposed on one another, the whole forming a

as with rubber, is deposited on the fibres in suspension and confers the qualities of moisture resistance, etc., to the paper. Undoubtedly the manner in which this operation is carried through influences the result and the quality of the product. The process is applicable to the usual paper-making fibres, such as wood pulp, cotton, etc., but is also applicable to asbestos fibres.

### Waterproof Paper

Latex has also been used in making waterproof boards, and there are openings for paper impregnated with latex and other substances in the electrical industries. Latex-impregnated paper, however, is too expensive to wholly replace the waxed paper which is used in such large quantities for the manufacture of containers, although a mixture of latex and wax emulsions can be easily made and has definite advantages (Brit. Pat. 335,271 and others). For example, such a product has been used for proofing cardboard containers for cream, pickles, foods, colloidal sulphur paste, etc. The deposit on the cardboard is more flexible than the plain wax as ordinarily used, it does not crack like wax alone and therefore does not give rise to leakages; there is no need to vulcanise it.

Among miscellaneous uses there are processes for incorporation of latex in viscose for the manufacture of artificial silk, and for incorporating rubber with casein for the manufacture of the well-known compositions which now often take the place of ebonite and celluloid in the manufacture of combs, knife handles, artificial bone, ivory, etc. The latex is said to produce articles of greater flexibility which are more easily worked. Latex may also form an ingredient of water paints or distempers—such materials should comprise antiseptic ingredients to prevent subsequent mould development in damp situations. Here, however, there are certain difficulties arising from its tendency to clot or coagulate. Although it is not so difficult to produce a distemper with latex as a constituent which will keep satisfactorily and which can be applied with a brush, the friction causes the latex to coagulate on the tips of the hairs and the distemper becomes unworkable. The trouble appears to be of a mechanical origin and additions of stabilisers, of which a variety have been tried, have not been found effective.

#### Round Rubber Threads

By allowing latex to exude through a round orifice into a bath of coagulant one obtains a coagulum in the form of a round thread. The coagulum takes up the shape of the orifice and by adoption of this method it is possible to prepare round rubber threads, of superior physical properties, for such uses as the manufacture of elastic webbing, etc. The threads being perfectly circular have several advantages over the square cut threads previously available for this purpose. According to Brit. Pat. 311,844, the process consists of forcing concentrated compounded latex into a dehydrating and setting medium, such as a solution of ammonium acetate, subsequently drying and vulcanising. In this way round rubber thread can be made in various sizes from a diameter of 1/100 in. upwards. Heat sensitised latex (Brit. Pat. 284,608 and others) may be advantageously employed for extrusion processes, since the coagulating bath can be entirely dispensed with and the latex extruded through heated nozzles which automatically give rise to coagulated threads, which are subsequently dried and vulcanised.

Latex is also used for bonding fibres in one or two special processes. Thus, in binding the "pile" of carpets, the fibre of the pile is drawn through a woven backing and anchored by means of rubber deposited from latex. The rubber film also serves as a non-slip backing, so that the application of latex has two valuable effects. In another direction it has found an important application as a cement for sealing the seams of cans. Here the latex is run round the well of the can bottom and on drying deposits a tough film which cushions and seals the edge of the body of the can when this is applied and the rim edge turned over. For this application it is usually compounded with fillers, etc., in order to thicken the cement and harden the deposited film (Brit. Pat. 289,270, 302,587 and 307,742).

#### The Marketing of Latex

It was not until the year 1922 that records began to be kept of the exports of latex from Malaya and the Netherlands East Indies. In that year 368,644 gallons were exported. By 1925 the exports had increased to nearly 3,750,000 gallons, after which there was a setback to 1,618,600 gallons in 1927. Since then exports have shown a steady annual increase and it is expected that the final figures for 1932 will show an advance on the record figures reached in 1925.

Latex is usually carried to consuming markets by (1) steamer tanks; (2) iron drums containing about 40 to 47 gallons; or (3) wooden cases, each holding two tins and each tin containing about 4 gallons. The gross weight of a case is about 100 lbs., so it is a handy-sized package as compared with a drum of about 500 lbs.

If stored in properly sealed containers, latex should keep its condition for a long time. The containers should be shaken each time any latex is required. Exposure to the air should be avoided as much as possible, otherwise the ammonia evaporates and the preserving power is lessened. Samples in bottles should be kept tightly corked or sealed. When containers are opened, only sufficient latex for the actual work in view should be poured out, and the container should be immediately closed.

## The Stability of Cyclic Compounds

### Valency Deflexion of Hypothesis

DR. J. F. J. DIPPY read a paper on "The Stability of Cyclic Compounds" at a joint meeting of the South Wales Sections of the Society of Chemical Industry and the Institute of Chemistry at the Cardiff Technical College on February 24. Dr. Dippy said that in 1885 W. H. Perkin, junior, published his first research upon the synthesis of closed carbon chains. He sought to demonstrate that rings of fewer than six members could exist; this revolutionary departure was ultimately so successful that even conservative opponents of Perkin's views acclaimed and accepted his results. In a comparatively short time three, four and five membered rings had been synthesised. An outcome of this research was the development of Baeyer's strain theory which attempted to relate the stability of a cyclic compound which the strain set up between the inter-valency angles as a result of the departure from the normal tetrahedral configuration. This theory, though applicable to the simplest case, does not satisfactorily explain the stability of the majority of alicyclic systems, since, in particular, it fails to take into account the influence of the substituent groups in a system. This fact was demonstrated by Thorpe and Ingold. It follows as a result that the angle between any two valencies of a carbon atom is determined by the mode of combination of the other two valencies, that is, by the bulk of the attached groups. Ingold gave to this modification of Baeyer's theory a limited quantitative basis. Much experimental and physical support has been given to this newer form of the strain theory, which is now termed the valency deflexion hypothesis. The principle is clearly shown in the tendency to cyclo-propane ring formation of the  $\alpha$ -brano derivative of the glutaric acids.

However, there have been criticisms levelled at the valency deflexion hypothesis from the point of view of premises and application. An outstanding difficulty arises in the use of

any cyclic-strain theory based purely upon special considerations, in that the substituents of a system while possessing bulk, also possess polar character. This latter factor might easily affect the course of a reaction which is being taken as a measure of ring stability. This complication has, doubtless, been the cause of the so-called anomaly in many of the reactions hitherto studied. To distinguish between special and polar effects is a most difficult problem, and it is at present recognised that any satisfactory strain theory must take both effects into account. Recently attempts have been made to trace the superposition of polar upon special effects.

Of late years interest has been attracted to the preparation, by Ruzicka and co-workers, of high-membered carbon rings of great stability. Rings with more than thirty members have been obtained. The stability of such rings is understood by assuming that rings of more than five members tend to relieve their internal strain by distortion from the planar condition (this can be demonstrated by the use of models). This extension of the valency deflexion hypothesis, termed the Sachse-Mohr theory has been given conclusive proof, as for example in the isolation of cis and trans forms of decalin. The connecting link between the planar low-membered forms and the distorted high-membered forms is the six-membered ring. The present view, due to Baker and Ingold, is that this ring buckles but possesses strain, since it is in constant vibration between the two stabilised extremes (*cis* and *trans*) which therefore introduces an intermediate strained planar phase. This conception is in agreement with facts and has received a measure of experimental support.

The present position of the whole subject is that the valency deflexion hypothesis in its widest form is capable of co-ordinating the plain facts of stability of all alicyclic rings when it can be applied in conjunction with polar considerations.

## Paint as a Wood Preservative

### Dr. L. A. Jordan speaks to the British Wood Preserving Association

ALTHOUGH paint was not altogether blameless where troubles occurred in its application to wood as a preservative, the vagaries of the wood itself were at least as much to blame, said Dr. L. A. Jordan, director of the Research Association of British Paint, Colour and Varnish Manufacturers, in the course of a lecture on paint as a wood preservative, delivered before the British Wood Preserving Association on February 22. One should consider the provocation to which paint was subjected before one should form any judgment as to the relative responsibilities for the state of affairs existing here and there between paint and wood. Much loss of timber could be prevented where creosote could be used, but creosote was a poor thing from the point of view of appearance, and in many situations its use was impossible owing to its smell and its inability to take decorative coats. Wood had to be preserved against many things besides dry rot—as, for example, weathering and distortion. Paint preserved wood in its own particular way, although its ubiquity and value depended on the fact that it also did other things.

Paint makers were conscious of their interest in the preservation of wood, yet one had to admit that the words "wood preserving" suggested creosote. The truth was that creosote and paint did not meet on common ground. Creosote was a powerful antiseptic; it penetrated deeply into the wood, and in the field of wood preservation it was not only unique in its function but, economically, a factor of dominating importance. The complications of bad smell, the unpleasant results of human contact, the lack of any decorative value, were misfortunes, and to some extent, they could be mitigated by further study and research. Paint, on the other hand, decorated; it limited and controlled the movement of water; it prevented distortion; in particular situations it protected against wind erosion and general weathering; it protected against fire to an appreciable extent; and it protected against fungoid growths. The application of paint, as of creosote and other preservatives, nevertheless was conditioned by the nature of the wood, its cut and its state of seasoning.

#### **Effects of Moisture in the Wood**

The proper painting of a piece of wood would go a long way towards preventing dry rot and the like. He would not pretend that, as an antiseptic paint was in the same class as creosote, paint could have only a skin effect, whereas creosote was capable of material penetration. Nevertheless, creosote did not appreciably affect the permeability of wood to water unless it be mixed with or contained a residuum of other tar oils, nor did it control distortion to anything like the extent that a properly applied paint coating would. Hence, it was fair to say that creosote sufficed only as a general preservative where the mass of the structure was so great that small distortions were of no consequence, or where, in the case of some interior work, the incidence of dimensional changes due to moisture variation, and limitations of decoration, were not serious. Dealing in more detail with the effects of water in wood, Dr. Jordan said there was a definite and known equilibrium for the moisture content of wood substance under conditions of definite relative humidity and temperature. The wood substance could imbibe more liquid, causing it to swell, or liquid might diffuse out, causing it to shrink, as the case might be, and there was little doubt that the tendency of wood to warp or shrink or swell and its capacity to resist weathering depended more upon the water content and on the swelling characteristics than upon anything else. Thus, the ideal painting condition was for the wood to be already in equilibrium with its surroundings. Paint coats did not absolutely prevent changes in moisture content—indeed, absolute impermeability was not necessary, and was probably undesirable—but they did exercise a controlling influence and reduce the amplitude of those changes. Nevertheless, it was reasonable.

Under normal conditions of exposure, water in large amounts gained access to a painted surface only for short times during wet weather and did little harm in the ordinary way. The slow, deliberate access of moisture to the back of painted wood was a much more troublesome matter, setting

up a condition which might lead to early general failure and blistering, as well as being the root cause of the discolouration effects sometimes seen. It was by no means certain that wet conditions always constituted a determining factor in the formation of blisters. That blisters could be formed at will on wood work through the accession of water to the back of the film could be demonstrated experimentally. The primary factor affecting blistering was undoubtedly adhesion; it was seldom that blistering was found except close to the wood. It was quite clear from experimental determinations on the elongation or extensibility of paint films under load that the capacity to form blisters was well within the elastic limits of paint films. The excess internal pressure required to form a blister was, in the case of soft films, of the order of 1 to  $1\frac{1}{2}$  lb. per sq. in., increasing up to a limit, in the case of very hard films, of about 12 lb. per sq. in. Assuming the average figure of  $1\frac{1}{2}$  lb. per sq. in. this pressure could be obtained on the basis of gaseous expansion by a temperature increase of  $28^{\circ}\text{C}$ , a rise which was quite possible by exposure to strong sunlight. As, however, the internal blister pressure developed would arise, at least in part, from the vapourisation of some liquid material as well as by the expansion of gas, a temperature rise well below  $28^{\circ}\text{C}$ . would be sufficient to promote the necessary active forces required in producing the blister.

#### **Importance of Moisture Control**

The importance of water control in wood was recognised, not only from the painting, but also from the distortion, point of view. Some timber merchants in the United States appeared to be applying aluminium paint to their timber to prevent distortion in storage and before use. In short, they regarded the danger of distortion as being greater than the danger of micro-organisms; and, incidentally, the aluminium paint would probably cut the incidence of such attack to, say, 10 per cent. Maybe creosote would cut the danger almost to nothing, but it would offer no protection against distortion. The resinous content of wood was second only in importance to the water equilibrium when one was considering painting; resinous spots and streaks might carry paint for years, or they might show through quickly. The views expressed by different authorities suggested some doubt as to whether resinous exudation was a cause of cracking and flaking of the paint or whether resinous exudation awaited the development of some weakness in the coating. The first view was the more reasonable, but on the other hand, there was no question that the nature of the resinous material and other oil soluble extractive materials in different woods influenced the behaviour of paint coatings, quite apart from the mechanical effects pushing away the paint. In certain cases these influences were unfavourable to the paint, due, for example, to acidity in the resin, and it had been suggested in other cases that the influence might be favourable, due to something approaching plasticiser action of the resin on the paint film.

The priming coat was the key to the successful painting of anything. In the mechanical sense the priming coat was consumed very largely in filling the voids and leaving a level non-absorptive surface on which subsequent applications could be built. Nevertheless, this filling of the voids was only a superficial matter, as was evident from the small amount of paint required for priming. End grained wood surfaces consumed much more paint for priming, owing to the cut being at right angles to the long ducts. Thus, although there really was a difference in the amount of penetration and the amount of paint consumed in the priming of different woods and different parts of the same wood, the real difference was not much greater than the variations in the practice of individual painters applying the paint. It might be suggested that deep penetration was desirable in painting wood, but actually there was no real proof of this condition; there were types of paint which could be applied very successfully to wood in which the penetration was undoubtedly at a minimum. Deep impregnation was not so necessary as continuity of the film.

## Confidence in the Future

### Development Scheme of Boots Pure Drug Co.

IN THE CHEMICAL AGE of January 28 we commended to our readers the Prince of Wales's appeal for the putting in hand of work for the unemployed, and invited firms in the chemical industry to tell us what they were doing in this direction in order that the cumulative effect of such information might inspire new confidence in the industry generally. Boots Pure Drug Co., Ltd., has led the way by sending us the following communication:—

That Boots Pure Drug Co., Ltd., has confidence in the future is evidenced by the way it is pressing forward development schemes on both the production and the retailing sides of their business. The fine new production unit at Beeston is part of a wider scheme designed to cater for all future requirements. This unit is just coming into production. In addition, the following schemes for helping unemployment and preparing for the economic handling of increased business in the future are all in hand:—

Re-organisation of warehouses and re-fitting of premises vacated by production departments now housed in the new works, Beeston. On this work about 200 additional men are being directly employed by the firm.

Erection of a new garage and engineers' stores at the Beeston works—estimated cost £25,000. This is being carried out by Swift Bros. and Haslam to designs prepared under the direction of the chief engineer to Boots Pure Drug Co., Mr. C. H. Jessop.

Extension of roads and drains on the Beeston site. Additional concrete roads with all drain services are being laid in anticipation of further building extensions, and to

provide complete one-way traffic to the receipt and despatch points on the site.

Survey of staff position and engagement of additional labour in all sections where pressure of work has been maintained.

Engagement of juniors for training in operations requiring practice to acquire the skill of an expert.

#### Indications of a Forward Movement

The G.K.S. Combustion Co., Ltd., writes:—Whilst there are definite indications of a forward movement in the British chemical plant industry, conditions will have to improve considerably before any appreciable absorption of unemployed can be anticipated, and the question therefore resolves itself into "How can the chemical and allied industries help?" To those employers of labour who are favourably placed as regards current orders and forward contracts, there is no need to appeal, unless it be for financial help; they will naturally absorb labour to the extent of their present production capacity. No one, least of all the unemployed, likes the word "charity," therefore it is essential for all employers to make every possible effort to provide work of some nature. The only solution, therefore, is the rigorous enforcement of the slogan "Buy British—Sell British—Employ British."

Le Grand, Sutcliffe and Gell, Ltd., write:—We are doing all we can to increase employment by increasing our sales activities, which we have reason to believe will result in more work, which in turn may enable us to employ more workpeople. We happen to be a little busier at the moment, and have several interesting contracts in hand.

## A Promising New Fertiliser

### Investigations on the Treatment of Peat with Ammonia

AMMONIATED peat, a new fertiliser material, has been developed in the laboratories of the United States Department of Agriculture. It seems to combine many of the good features of the two familiar types of nitrogen-carrying fertilisers. As yet it has not been developed commercially, but according to the "American Fertiliser" (December 31, 1932), the manufacturing process is simple and relatively inexpensive and that the commercial production of ammoniated peat offers opportunity for material saving in freight on fertilisers.

By heating ammonia and peat under pressure, about two-thirds of the reacting ammonia is changed to chemical combinations that are not soluble in water. These forms are generally similar to the nitrogenous fertiliser materials in cottonseed meal and animal tankage. Depending on temperature, the peat may be ammoniated to contain up to 20 per cent. of nitrogen. A 20 per cent. product would thus contain in each 100 lb. nearly half as much quick-acting nitrogen as 100 lb. of sodium nitrate and would at the same time contain about twice as much slower-acting nitrogen as 100 lb. of cottonseed meal. In other words, 100 lb. of 20 per cent ammoniated peat would be roughly equivalent to 200 lb. of cottonseed meal plus 50 lb. of sodium nitrate. The product could be shipped with notable savings in freight and with notable advantage in combining the good features of both the slow-acting and the quick-acting nitrogen carriers. Raw peat, it may be added, is of relatively little value as a nutritive ingredient in fertilisers, but is recognised as a highly desirable element in mixed fertilisers because of its value as a conditioner and because it supplies to the soil a desirable form of organic matter.

Anhydrous ammonia (liquefied ammonia gas) is manufactured by the Haber process of nitrogen fixation. The nitrogen is derived from the air, and ammonia is at present the most concentrated source of nitrogen for fertiliser manufacture. It may be shipped by tank cars from the nitrogen fixation plants to the fertiliser factories. In the United States the utilisation of peat for the preparation of ammoniated peat offers commercial possibilities, because peat

is widely distributed and occurs within short distances of the principal fertiliser consuming centres. The preparation of air-dried peat is an inexpensive operation and the addition of ammonia demands merely provision for heat and pressure. Preliminary experiments indicate that peat is not the only possible carrier, but that similar results may be obtained with various carbonaceous materials ranging from lignite to plant residues of various sorts.

#### Comparison with other Fertilisers

A familiar drawback to the quick-acting fertilisers such as sodium nitrate is that they are readily soluble in water. Heavy applications may burn the plants and the surplus which the plant cannot use immediately is likely to be lost in rainwater run off from the field and by leaching. The slower-acting organic fertilisers—cottonseed and linseed meals, tankage, blood, etc.—have been used increasingly for feed-stuffs and in industry, thus limiting the supply and raising the price for fertiliser use. These have been recognised as desirable because they release the nitrogen gradually, feed the plants over a longer period, and may be applied in greater quantity with less waste by leaching and drainage.

Ammoniated peat, on the other hand, offers not only the possibility of a cheap nitrogen carrier, but other advantages for use in mixed fertilisers. Its physical characteristics are such as to make it a splendid conditioner in mixed fertilisers, preventing the caking of the product, and keeping the mixture in condition for easy distribution. The advantages offered by the ammoniated peat as a fertiliser material are numerous and apparently convincing, but its utilisation in the manufacture of mixed fertilisers is yet to be developed.

The United States Bureau of Chemistry and Soils has been developing the ammoniation of peat by different methods. Workers at the Fixed Nitrogen Research Laboratory heated peat and anhydrous ammonia in a closed bomb, producing a product containing up to 20 per cent. nitrogen. Seeking to decompose peat, somewhat similar results were obtained by heating the peat under pressure with aqueous ammonia.

## Death of Dr. Alfred Ree

### The Chemical Industry Loses a Well-known Leader

His many friends in the chemical industry will learn with regret of the death of Dr. Alfred Rée, a former president of the Society of Dyers and Colourists, vice-president of the Society of Chemical Industry, and first chairman of the British Association of Chemists, which occurred at his home at Withington, Manchester, on Sunday, at the age of 70.

Dr. Rée was born at Leeds and educated at the Bradford Grammar School and later at the Geneva and Munich Universities. For a time he was in business as a chemical manufacturer, but he retired from active business to devote his time to various interests in the chemical and dyestuffs industries, in the work of the Manchester Chamber of Commerce, of which he was president for two years, and in education, which he served in one capacity as a co-opted member of the Manchester Education Committee from 1910 until his death. He had been a member of the Manchester Chamber of Commerce for some years before he was made a director in 1910. He was particularly interested in the formation of a testing-house, and the present department was largely his creation. He was chairman of the section for twenty-two years.

One of his early works for the Chamber of Commerce was done in securing reform of the patent laws. He was vice-chairman of the chemical section, and was one of the foremost in the conduct of the chamber's international affairs, representing it at the first meeting of the International Chamber of Commerce in 1920. The year before he had represented the chemical section of the Federation of British Industries in a deputation to the French Government. During the war he was active in the formation of the Association of British Chemical Manufacturers and became a member of its council

in 1916. He was still an honorary member of the council of the Association at the time of his death. The same year he was elected president of the Society of Dyers and Colourists and remained in that office for two years. He was also a member of the board of the British Dyestuffs Corporation.

Dr. Rée was elected president of the Chamber of Commerce in 1924. The year saw several happenings of importance. The Joint Committee of Cotton Trade Organisations came into being during the year, and the president was its first chairman. This move was regarded elsewhere as probably the prelude to some dramatic action by the Lancashire cotton industry, and manufacturers abroad were actually holding back publication of prices in the expectation that they might have to meet an acute price competition. Dr. Rée's answer to this misunderstanding was to make the joint committee a permanent body; for he was aware that no attack of the kind was possible and was averse from conveying any false impression. Dr. Rée took to Downing Street probably the largest delegation ever organised by the chamber, and this body of 30 or 40 argued the case of the yarn and cloth trade with the Prime Minister and succeeded incidentally in effecting a great change of opinion through the country.

His work for education was not limited to the Education Committee. He was a treasurer and deputy treasurer

of the Manchester University and chairman of the chemical section of the Manchester College of Technology. He was also for three years an inspector of research for the Board of Trade. In the course of his life abroad he became Doctor of Philosophy of Berne University, and he also travelled in the United States.



THE LATE DR. ALFRED REE

## American Sulphur Industry

### An Advanced Summary

THE following information on sulphur production and markets during the past year is furnished by the United States Bureau of Mines. The output of sulphur in the United States in 1932 dropped to less than one half of the quantity produced in 1931. Shipments and exports showed smaller decreases than production, and stocks were reduced.

Sulphur production amounted to 880,695 long tons in 1932, a decrease of 58 per cent., compared with the output in 1931 of 2,128,030 tons. The amount produced in 1932 was 1,669,286 tons, or 65 per cent. less than that reported in 1930, the record year. Shipments declined from 1,376,526 tons (valued at about £4,860,000 in 1931) to 1,108,112 tons. The new property of the Jefferson Lake Oil Company, Inc., in Iberia Parish, Louisiana, was put into operation the latter part of October. A production of 13,401 long tons was reported by this company but no shipments were made. Most of the output in 1932 was mined in Texas, and from this State has come virtually all of the production of recent years. Texas produced 876,294 tons of sulphur in 1932, or 98 per cent. of the country's total. No imports of sulphur ore were recorded by the Bureau of Foreign and Domestic Commerce for the year 1932.

IMPORTS of chemicals, drugs, perfume and similar products into the Irish Free State during January decreased considerably and the total value was £62,085 as compared with £76,488 in the corresponding months of last year. In addition, chemical fertilisers valued at £34,858 were imported in January, 1933, compared with £40,709 in the same month of 1932.

## New Source of Alumina

### Russian Investigations Anticipate Use of Nephelite

IN view of the growing demands upon bauxite as a raw material for alumina manufacture, some interest will be aroused by the plans to exploit the immense deposits of nephelite (an aluminium silicate) on the peninsula of Kola in the Arctic Circle. In the course of an account of preliminary investigations at the Leningrad State Laboratories (F. Vogel, "Chemiker-Zeitung," February 8, 1933, pp. 101-103) it is stated that treatment of nephelite ore with hydrofluoric acid offers some prospect of commercial success. Of peculiar importance in the working up of aluminium silicate ores is the value of the by-products since the relatively low market price of aluminium does not in itself offset the expenditure on reagents. From the by-product standpoint, therefore, the decomposition of nephelites and other aluminium silicates by means of hydrofluoric acid is an attractive one, owing to the large output of pure silicate acid, and the possibility of obtaining also such technically important compounds as sodium or potassium silicofluoride and potassium or sodium fluoride. The outlet for the hydrofluoric acid process will be substantially improved by a cheap source of production of this reagent, and it is interesting to note that the author points out the probable existence of fluorite deposits in the vicinity of the area of operations.

PROFESSOR Arthur Lapworth has been appointed as Vice-Chancellor of the University of Manchester for a term of two years. Mr. W. W. Kay (Manchester), at present assistant lecturer, has been appointed as lecturer in Chemical Pathology at that University.

## New Technical Books

**THE KINETICS OF HOMOGENEOUS GAS REACTIONS.** By Louis S. Kassel. Pp. 330. New York: The Chemical Catalog Co. \$6.50.

Progress in the subject of kinetic reactions within the last decade has been rapid, but not always orderly. On the experimental side confusion has been produced by the complex interdependence of masses of data, but this book aims at presenting all the interpretable data from a single point of view. The theoretical treatment which is given has been based entirely upon methods of statistical mechanics, as this seemed to be the only rational procedure. An attempt has been made to make the theoretical and the experimental parts of the book complete in themselves, by including in each as much summarised information from the others as seemed relevant. In this way it has been hoped to cater for the needs of a variety of readers ranging from the mathematical physicist to the experimental chemist who is concerned entirely with the measurement of reaction rates. In the experimental part a wide range of reactions is dealt with, and methods of calculation and accuracy are discussed. The book is published as one of the American Chemical Society's monographs.

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**MANUEL DE CHIMIE GAZIERE,** Méthodes et Procédés des Essais et Analyses en Usage à l'Usine Expérimentale de La Villette de la Société du Gaz de Paris. Borg Emile Sainte-Claire Deville. Second édition, with collaboration of Paul Sainte-Claire Deville. Paris: Dunod. 43 fr. (paper cover, 38 fr.).

This book explains the methods of examination and analysis, as carried out at the experimental laboratory of the Société du Gaz de Paris, in order to show the qualities or defects in different products produced in oil distillation. It is a work of precision, clear and concise, and has been carefully revised and enlarged, so as to include new and more important processes. For example, there is a long account of the preparation of naphthalene by the picric acid process; there is also an explanation of the new methods employed in obtaining tar as well as the preparation of sulphur, prussian blue, sulphocyanic acid, and iron in the pure state. The book comprises 240 pages and there are many diagrams of apparatus, and should be of value to those associated with gasworks laboratories and to all who need to know something about the chemistry of combustion.

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**QUALITATIVE CHEMICAL ANALYSIS: PRINCIPLES AND METHODS.** By Herman T. Briscoe. Pp. 279. Macmillan and Co., Ltd. 10s. 6d.

The methods and principles which make up this book are those which the author has used in classes for many years at Indiana University. The aim has been, first of all, to present the theories and principles of electrolytic solutions and the properties of the anions and cations which are involved in the various analytical procedures. The study of these procedures serves as an introduction to physical chemistry, and this is of great value to the student who will never take a course in physical chemistry, since it will give him some knowledge of the most fundamental concepts of theoretical chemistry. In his study of the preliminary experiments the student is placed upon his own responsibility in observing results and in drawing conclusions. The author believes that laboratory work proves its worth in the training of students in chemistry only when it gives the student an opportunity, and even forces him, to investigate for himself and to explain the results of his investigations in terms of his own knowledge and experience.

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**EXPLOSIVES: THEIR HISTORY, MANUFACTURE, PROPERTIES AND TESTS.** By Arthur Marshall. Vol. III, Second Edition. Pp. 286. J. and A. Churchill, 42s.

The first two volumes of this work were published in 1917, and are still in print. This third volume is therefore intended to be supplementary, but is provided with a full alphabetical index to the complete work. In many of the subjects previously dealt with there has not been sufficient advance

since 1917 to merit further treatment in the third volume, but, on the other hand, there have been numerous fresh developments which were not even mentioned in the previous volumes. Technical advance in the production of some of the primary materials, such as sulphuric acid and nitric acid, has also been noteworthy, but as these developments have received attention in other books the amount of space devoted to them in the present work has been limited. The present volume is divided into sections which cover historical development, black powder, acids, solid nitric esters, liquid nitric esters, nitro-compounds, smokeless powders, blasting explosives, general and special properties of explosives, stability, and the analysis of materials. There is also an appendix containing thermo-chemical tables.

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**LES COLLOIDES, LEURS GELES ET LEURS SOLUTIONS.** By Paul Barry. Paris, 1933.

This new edition has undergone many changes, as almost to make it a new book. These changes have been rendered necessary by the development of theories of colloidal chemistry during recent years, for the last decade has been marked by a rapid growth of ideas in the realm of chemistry, and especially in colloidal chemistry, about which there is still much to learn. The aim of the book is to give the industrial chemist, who may happen to come up against colloidal solutions in industry, a concise and standard account of their uses, properties and preparation. The first part of the book deals with the general physical properties of colloids in the sol and gel phases, and other phenomena such as swelling. The preparations of both mineral and organic colloids are given, with a detailed account of the preparation of metals, their oxides and chief salts. Numerous methods for the preparation of colloidal copper sulphate are given, and the fairly recently discovered Hatschek method for the preparation of colloidal arsenic sulphide using the trioxide. The closing chapters deal with the theory of colloids, and with emulsions, the last being of particular interest.

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**UNIT PROCESSES AND PRINCIPLES OF CHEMICAL ENGINEERING**  
By John C. Olsen, in collaboration with others. Pp. 558. Macmillan and Co., Ltd., 25s.

This book represents many years of experience on the part of the author. It has been prepared primarily for classroom use under the guidance of a competent instructor familiar with present-day chemical processes in practice, but the wealth of information which has been incorporated will give it a much wider circle of readers. Professor Olsen, of the Polytechnic Institute, Brooklyn, N.Y., has been fortunate in being able to secure the co-operation of a group of successful practical chemical engineers who have prepared the majority of the chapters in the book. As each of the collaborators has devoted himself to his own special field, the technical information is up-to-date and accurate, and it is hoped that any difference in method of presentation and point of view which may be found in these chapters will only serve to enrich the subject for the student. Of course, it has not been possible to present and discuss every fact of every unit process, but the selection which has been made includes the most important and the most fully studied and developed processes. Heat and power are dealt with by Crosby Field, president of the Flake Ice Corporation, Brooklyn; evaporation, by Alfred L. Webre; principles of fractional distillation, by Theodore Baker, of E. I. du Pont de Nemours and Co.; steam distillation, by James W. Lawrie; dry distillation at by-product recovery, by F. W. Sperr, director of research to The Koppers Co., Pittsburgh; filtration, by Charles L. Bryden; electric heating, by Robert M. Keeney; catalytic processes, by P. H. Emmett, of the Fertiliser and Fixed Nitrogen Laboratories, U.S. Department of Agriculture; absorption of gases, by Andrew M. Fairlie; electrolysis, by L. D. Vorce, of the Westra Chlorine Products Corporation; separation of solids and liquids from gases, by Percy E. Landolt; whilst flow of heat, drying and materials of construction are by Professor Olsen. Additional chapters are devoted to costs and financing (by George A. Prochazka) and factory location (by J. L. Warner).

## Japanese Electrochemical Industry

### New Association to be Established

IN November of last year a meeting of leading electrochemists was held in Tokyo to talk over the founding of a new organisation for electrochemistry in Japan. This organisation, according to the "Journal of the Society of Chemical Industry, Japan," will be named "Denki-Kwagaku Kyokwai (The Electrochemical Association)" and will embrace not only persons engaged in researches but also those engaged in industrial circles. The need of an electrochemical society has long been felt among electrochemists, and until now there has not been a society embracing all the electrochemists of the country. To-day, almost all the branches of the electrochemical industry exist in Japan. The only exception is the manufacture of aluminium, of which convenient raw materials are lacking in that country. The reason that their electrochemical industries are on such a small scale lies in the geographical situation of Japan, which is entirely isolated, and therefore has not the outlet for these products in the neighbouring oriental countries where chemical industries are not yet prosperous enough to demand the primary products of this industry.

Hydrogenation of fatty oils is one of the important industries in Japan, but the consumption of hydrogen in this direction is insignificant as compared to that for ammonia synthesis, and moreover not a small part of the former is supplied by the hydrogen from electrolysis of brine. The production of nitrogen in 1931 was 245,000 tons, of which 160,000 tons are by synthetic process and other 77,000 tons by calcium cyanamide process. The Japanese nitrogen industry suffered much from dumping from England and Germany a few years ago, and the price then of this commodity fell even below the lowest limit which had been expected. But now, under the favour of the reprobation of export of gold this industry is making constant developments. The manufacture of calcium carbide is one of the oldest electrochemical industries in Japan. The production in 1930 was 253,000 tons, 180,000 tons of which were transformed into calcium cyanamide. A part of them is utilised for the manufacture of acetic acid at the Ogaki plant of the Ibigawa Electric Co. and at the Minamata plant of the Japan Nitrogen Co. In the latter one acetic anhydride is manufactured as well, and production of acetate silk is now contemplated. Calcium cyanamide is produced from eleven factories where special furnaces of continuous types are generally adopted for the nitration of calcium carbide.

#### Electrolytic Soda Plant

Japanese electrolytic soda plants have a capacity of 35,000 tons of caustic soda and 30,000 tons of chlorine a year which corresponds to 14,000 kilowatts of electric power. According to the sudden increase of the production of viscose silk in recent years, our demands for caustic soda are also showing a rapid increase. But the problems of the economical disposition of chlorine and the supply of industrial salts of excellent quality make it difficult to meet the whole demands of caustic soda in home by this process alone. For such reasons considerable amounts of caustic soda are manufactured lately by the caustification of soda ash. There are eleven manufacturers of electrolytic soda: three plants adopt the mercury process but others are based on diaphragm processes of various types. Chlorine which is produced is utilised mainly for the manufacture of bleaching powders, the production of which is about 40,000 tons per year. The production of synthetic hydrochloric acid and liquid chlorines are rapidly increasing. In 1931, 20,000 tons of hydrochloric acid were produced by this method, which corresponds to 60 per cent. of the whole production of hydrochloric acid. Utilisation of chlorine is seriously considered, for examples, the application of liquid chlorines to the preparation of pulp and sugar are yielding good results in laboratories. Chlorates are made chemically from chlorine in a few works. Bleaching liquor and sodium chlorate or perchlorate are manufactured, but they are not so important as to need special comments here.

In the manufacture of light metals there are four plants for sodium in Japan, namely at Toyama, Higashi-Iwase, Kōriyama and Fushiki, and one plant at Kashiwazaki for

magnesium, but none for aluminium. Sodium is obtained by the electrolysis of molten caustic soda and about 1,000 tons of its annual production are partly consumed for the manufacture of sodium peroxide and cyanide and other part is appropriated for the dyestuff industry. Magnesium production is only 48 tons a year now, but the capacity will be doubled in the near future. The usual aluminium ore, bauxite, is entirely lacking in Japan and therefore they have been obliged to have no aluminium industry up to now. As many researches done with a view to obtaining aluminium from clay or alunite are yielding sufficiently good results in laboratories, it will not be long before its manufacture is put in practice on an industrial scale.

#### Determination of Dehydration

##### Apparatus for Automatic Registration

IN the January issue of the "Collection of Czechoslovak Chemical Communications," originally published in Czech in No. 20 of the "Chemické Listy," by S. Skramovsky, the author describes a new apparatus for determining dehydration. Water in crystalline hydrates can be of two kinds: water of hydration (crystal water) or water of constitution. In chemical compounds often both kinds are found (aquo compounds, hydrates of hydroxides, etc.) and it is generally difficult to decide to which kind the water present belongs. When the element in question is capable of forming complexes, or gives soluble compounds, it is possible to derive reliably the function of the water as well as the number of its molecules from analogy or from the co-ordination number and the behaviour in relation to dissociation. However, this task is much more difficult with substances which are insoluble or which undergo hydrolysis. Here one of the means of discriminating between water molecules of different function is their behaviour in a dehydrating medium, in drying the substance either at room temperature above sulphuric acid or at a higher temperature. Although the second method has been applied to many compounds, it only rarely gives unambiguous results. The substance is dried generally at a constant temperature in the neighbourhood of 100° C. It would be risky to suppose that only the water remaining at this temperature in the form of lower hydrates is water of constitution.

#### A Regulable Electric Drying Oven

From this supposition M. Guichard studied the dehydration of sodium phosphate and aluminium hydroxide with increasing temperature by weighing the substance contained in a drying oven by means of a hydrostatic balance. Based on this idea a new apparatus has been made, and the increase of weight on drying with increasing temperature is registered automatically. The apparatus consists of a regulable electric drying oven, the temperature of which can attain 180° C. A weighed mount of the substance is lying in the drying oven on a dish suspended on a long thread passing through the cover of the drying oven and the balance case to a hook on the left arm of an analytical balance. To the middle of the beam a mirror is attached reflecting the image of a lighted slit into a rotating drum with sensitive photographic paper. The motion of the drum is transmitted by a gear to the regulator of the electric drying oven the temperature of which is thus increased regularly with time, when the drum rotates. The drum is revolved by an electric motor one rotation being performed according to need in a time of 50 minutes to 6 hours. The loss of weight is compensated by buoyancy of a hydrostatic float in paraffin oil (a glass rod of a definite diameter suspended from the right balance arm). As the viscosity of the oil alone was insufficient to damp the vibration of the beam, a circular brass plate was attached to the glass rod below the oil level which reduced the vibration of the beam to a minimum. When the apparatus is in action the loss of water is compensated by oil, the deflection of the beam increasing steadily, whereby the beam of light reflected by the mirror draws a graph, which describes the progress of dehydration with increasing temperature on the photographic paper. The temperature is registered automatically.

## A New Raw Material for the Plastics Industry Research on the Utilisation of Lignin Derived from Coal

ACCORDING to a paper by Drs. Franz Fischer, Otto Horn and Hans Küster, which appears in "Brennstoff-Chemie," December 15, 1932, research in the use of lignin promises to produce plastics for press bodies and especially from lignitic coals. Although the results of this research have not yet been applied commercially, there seems to be little doubt that commercial production will begin at an early date, especially as products can be made very cheaply, entirely from coal and its distillation products.

In the literature on plastic substances, reference is made to the production of artificial gums by the action of phenols on the so-called "sulphate liquors," and it has long been known that, through the action of phenols on lignin, especially in the presence of 1 per cent. concentrated hydrochloric acid, soluble products can be obtained from the lignin. The authors explain that time would not permit a discussion of the chemical relations of the phenol-lignin and, therefore, it was necessary to confine their remarks to their experimental work. The close connection between lignin, peat, brown and hard coals so far as they contain lignin-like material, and wood, suggested that treatment of the lignin with phenols might produce a material of the plastic mass type suitable for press-bodies. Obviously its production would have to be simple and inexpensive, and the product would have to possess properties sufficiently valuable to justify manufacture.

By the hydrolysis of different woods, by using 72 per cent. sulphuric acid, Dr. Horne obtained the following percentage yields of lignin:—Lime, 22 per cent.; birch, 23.8 per cent.; oak, 25.2 per cent.; beech, 25.6 per cent.; spruce, 26.6 per cent. and nut shells, 36.8 per cent. The lignin in different brown coals was also determined in the same way; the non-hydrolysable portions ranged from 66.4 to 92.8 per cent., calculated on material dried at 105° C. It has been known for some time that lignin soon dissolves in phenols, particularly in the presence of strong acid, and the authors, by their investigations, found that coals digested with hot phenols first swelled and then became partly dissolved.

### Treatment of Lignin with Phenol

For over a year experiments were made in the treatment of lignin in different kinds of coal with an excess of phenol, under a digestive temperature, then removing the excess phenol, and finally washing the product with benzol. In this way much information was obtained as to the substances and conditions necessary to obtain products which will permit pressures of 350 kg. per sq. cm. at a temperature of about 150° C. to form pressed objects. These experiments were made on cellulose, lignin, sawdust, peat, earthy brown coals, lignitic brown coals, humic acids, hard coal and other materials, using a cresol mixture supplied by the Gesell für Teerverwertung. The best results were obtained with lignin and lignitic brown coal. The necessary quantities of cresol and the most suitable manner of operating, were studied, and after many experiments, it was found to be advantageous to mill the solid raw material and to dry it by heating in vacuum. In most cases it was found that about 12 per cent. by weight of cresol was the optimum quantity, added to the material, and kneaded with it in a kneading mill for several hours at a temperature of about 80° C. Under these conditions a remarkable swelling of the volume took place, gradually reaching about double the original volume. The swelling ceases after a time, and then the excess cresol can be distilled in vacuum, leaving the material ready for the press.

Experiments were also tried with liquids other than phenols. While carbolic acid, the different cresols, and crude commercial phenol-cresol mixtures reacted with the materials to produce swelling and the possibility of manufacturing press-bodies, other liquids, such as phenitol and anisol, were found quite unsuitable, yielding products just as easily breakable as those obtained from lignin alone, or as those with glycerine, paraffin oil, glycol, etc. On the other hand, the organic bases were found very well suited to the manufacture of cohesive and strong press-bodies, both from lignin and lignitic brown coal. The bases tried were aniline, naphthyl-

amine, pyridine, piperidine and chinoline. These appear to act like phenols with the molecules of the lignin or similar material, the reaction being perhaps on the borderline of forming chemical compounds and absorption. The products, like that when cresol is employed, have little odour, and this disappears entirely when the material is heated in a press at 100° C., without appreciable loss of weight. But as a proof that the cresols or bases form no firm connection, or at least some part, is the fact that a part of the volatile matter can be driven out by distillation with steam. This suggests that a more intimate connection could be obtained by the use of a strong condensing medium, such as strong acids, but if the finished material is to be employed for electrical insulation it is desirable to avoid the use of strong acids which deprecate the insulating property.

### Characteristics of the Products

The behaviour of the material in the press is different to that of the formaldehyde-phenol products. Bakelite A, for example, first melts and then goes over the Bakelite C condition. But the product in question does not melt or undergo any similar transformation; it requires, therefore, different methods than those used for Bakelite. It is probable also that the products will mostly find employment for the manufacture of different objects than those made from Bakelite.

To test the mechanical properties of the new press material, test rods of suitable dimensions were made in the heated press and subjected to the same tests as are used in the Bakelite industry; these tests were made by the Presswerk Essen. The relative strength of the materials produced by varying the cresol percentage, and of Bakelite and phenol-formaldehyde products, was as follows:—

|                                |                         |     |     |     |     |              |
|--------------------------------|-------------------------|-----|-----|-----|-----|--------------|
| Lignite alone                  | ...                     | ... | ... | ... | 4.5 | Cm.kg sq.cm. |
| "                              | with 5 per cent. cresol | ... | 5.2 | "   |     |              |
| "                              | 7.5                     | "   | 4.9 | "   |     |              |
| "                              | 10                      | "   | 4.5 | "   |     |              |
| "                              | 12.5                    | "   | 7.5 | "   |     |              |
| "                              | 15                      | "   | 6.1 | "   |     |              |
| "                              | 17.5                    | "   | 5.3 | "   |     |              |
| Bakelite (Type "S")            | ...                     | ... | 5.0 | "   |     |              |
| Phenol-formaldehyde (Type "S") | ...                     | 9.2 | "   |     |     |              |

It is seen that the lignite-cresol products reach a strength of 5 cm.kg./sq.cm., which is the minimum strength demanded in the Bakelite industry, and that the test made on the product with 12.5 per cent. cresol showed a strength of 7.5 cm.kg./sq.cm. The phenol-formaldehyde test was made on a carefully prepared sample. The influence of pressure on the strength is such that if the pressure is taken above 300 kg. per square centimetre, an optimum is reached at about 900 kg. per sq. cm. beyond which there is no increase, but rather a decrease, in strength of the pressed material.

A very important property of this new material, as made from brown coal, is its machining property. In the pressing operation, metal parts can be pressed into the material; it can be filed, sawn, drilled, turned in a lathe, and polished to a high lustre; the surface is very hard. Polish is not obtained in the press. In the earlier experiments, air holes and bubbles were sometimes seen in the finished material, due to imperfect pre-drying of the raw material, but to-day, all these troubles have been overcome. At the same time, notwithstanding the progress made in developing a satisfactory material, the authors are convinced that it can be still further improved in different directions. Scarcely less surprising than the good mechanical properties of the material was its satisfactory behaviour as an electrical material. When made without employing acid, the material has very high insulating value. A rod of the material, to which the name "Kolonit" has been given, becomes electrified when rubbed, and behaves electrically like hard rubber, and this applies to the material made by the use of organic bases, as well as that made by the use of cresol.

Regarding production costs it is stated that 1 kg. of the material made from coal and cresol, the coal costs less than 1 pf., the cresol from 3 to 5 pf. and the cost of manufacture is scarcely 10 pf. This would make the total cost less than 15 pf., or something less than 2d. per kg.

## A Modern Method of Temperature Control

### Operation of the Magnetic System

TEMPERATURE control is a factor of increasing importance in modern industrial life, not only as leading to a desired conservation of heat but also because, in many processes, exact control of temperature within narrow limits is essential to their success. To give an inexpensive, effective, simple and reliable means of temperature control, a patented magnetic valve system has been evolved by the Magnetic Valve Co., Ltd. In its simplest form this system may be described as consisting of a thermostat designed to operate at any particular temperature, causing the energising of a magnetic field operating a solenoid, which, in turn, operates a valve. Much research and attention has been given to the finished design of valve, whereby all possibility of the working of the valve being impaired by the presence of glands with a consequent unavoidable risk of leaks has been eliminated. The special features of design have been patented. A virtue of the valve is the method of assembly which gives ready access to any part if occasion arises. The arrangement is very simple and service, when required, can be given by the ordinary mechanic. Valves have been evolved to eliminate risks such as those consequent upon escape of gas or oil when ignition has failed. Special consideration has been given also to the question of safeguard contingent on a

room or series of rooms. An accurate control of temperature can be secured through the use of thermostats made to control magnetic valves fixed on the hot water system. This supplies an immediate corrective to the tendency of such a system to produce over-heating, as the amount of heat delivered when not controlled is influenced to a negligible extent by the fluctuating differences between indoor and outdoor temperatures. Further, the rise in temperature from a number of people being gathered in one room is countered by the operation of the thermostats cutting off the supply of artificial heat. The use of magnetic valves controlled by thermostats, which can be fixed to secure a particular temperature within narrow limits is equally serviceable for cooling systems such as condensers, where waste of water is too frequently encountered. The control may also be applied in the case of fluids other than water and in fact, magnetic valves have now been designed to cover temperature control of a wide range of fluids.

It is essential that apparatus used in conjunction with automatic oil firing should be reliable. The magnetic valve control system has been adapted for controlling the operation of oil burners so that the oil, steam or air be shut off, should the limits of pressure or temperature be reached. Further-

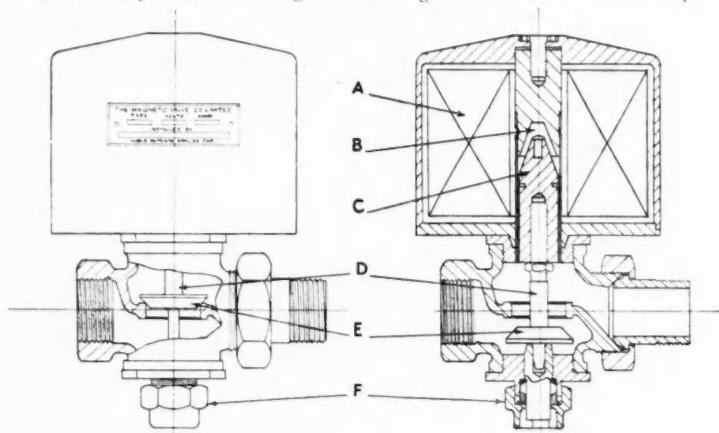


Fig. 1.

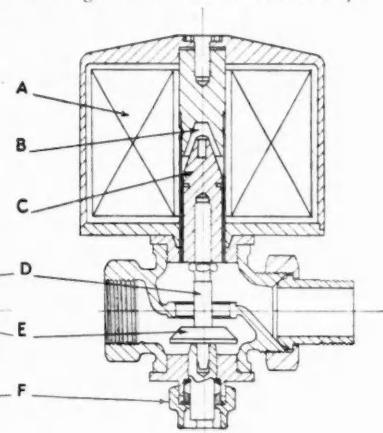


Fig. 2.

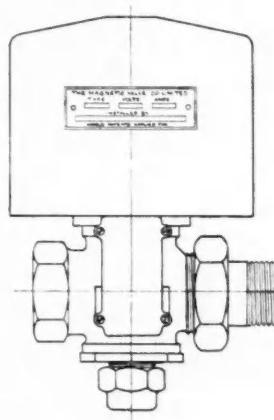


Fig. 3.

temporary failure of the electrical supply to the valves. The general principles of construction of the magnetic valve are as follows:—An electric solenoid (A) when energised, creates a magnetic force at a central point (B) (pole-piece); the magnetic force attracts a plunger (C), to which is attached a spindle (D), and valve head (E). This movement either lifts the valve head off its seating, as shown in Fig. 1, or pulls the valve head up to its seating, as shown in Fig. 2, 2, the valve thus may be either electrically opening or electrically closing. All valves can be fitted with hand regulation, as shown at (F), or independent of the magnetic operation, as in the case of bypass oil valves and diaphragm type gas valves. By this means should the electricity supply fail, the valve can be hand operated entirely. Pressure-switch, time-switch, hand-switch and numerous other forms of apparatus can be combined with magnetic valves to give accurate automatic or distant control.

Water, being cheap, abundant and having good thermal properties there is always a tendency towards careless usage, causing waste of material and inefficiency of operation. It is certain that, in the aggregate, very large quantities of heat are lost, directly and indirectly, by uncontrolled flow of water, whether it be used for heating or for cooling. Taking the central heating of buildings as an example, there is a definite need for a really satisfactory system whereby two essential goals may be reached with simplicity. (1) The elimination of waste of heat and so of fuel; (2) the automatic securing of a desired temperature, without fluctuation, in a particular

more, it furnishes by virtue of its principles, a positive safeguard against dangers resulting from failure of electricity supply or extinction of the flame. It also affords means whereby the oil may be kept at a constant temperature in order to secure uniformity of flow, etc. For the control of gas passing through pipes, the diaphragm type of valve is recommended. In this type, the valve proper consists of a diaphragm of specially treated leather supported by a plate to ensure a seating when the valve is closed. The outer edge of the diaphragm is fixed between metal rings, the opening or closing of the valve is effected by the movement of the leather. The diaphragm prevents any foreign substance from the gas or pipes working up into the operating parts of the magnetic valve. These valves can be supplied with a by-pass in the body, adjustable to allow a constant passage of a specified amount of gas. Further, a hand adjustment may be fitted to enable the volume of gas passing through the main valve to be regulated to a positive amount. They can be supplied either electrically opening or closing. It is important that where gas is controlled by an automatic device, either a by-pass is provided or a constant means of ignition of the gas at the outlet, so that danger from the escape of unburnt gas may not occur. For certain situations, hand control mechanism can be fitted so that when closing has occurred, the valve will not re-open until it has been deliberately operated manually. The pressure loss through these valves is approximately equal to that through a 10 ft. length of pipe of the same nominal size.

## Pure Vegetable Colloid A New Product of British Manufacture

A PURE vegetable colloid and gelatine, produced entirely from Carragheen (*Chondrus crispus*) has been shown at this year's British Industries Fair by Whiffen and Sons, Ltd. Introduced under the name of Gelozone, its use as a gelatinising agent is rapidly spreading in many industries. It has high gelatinising properties and is simple to use, and unlike gelatine, it can be used at high temperatures without unpleasant odour; in fact, to obtain its full power it is necessary to boil it, unless the commodity in which it is to be incorporated is subsequently boiled. It was originally manufactured as a culinary article for use in the making of blancmanges, creams, sauces, etc., and for thickening soups. By analysis it is found to consist of carbohydrates 64.78 per cent.; fat (soluble in light petroleum) 0.38; protein 6.69; mineral matter 18.40; fibre 1.80, and moisture 7.95.

When introduced Gelozone was taken up at once by food reformers, especially as many of them are averse to the use of animal gelatine. It has also been prescribed and recommended by the medical profession as a regular constituent in the dietary of diabetics, owing to the absence of non-hydrolysable carbohydrates. Sales are steadily increasing on the culinary side, but the largest growth has occurred on the manufacturing side, particularly in the manufacture of ice cream and re-constituted cream. In both of these industries it has been proved a perfect stabiliser and incidentally adds to the food value of such commodities. Other manufacturing uses are emulsions, sauces, thick pickles, blancmange and custard powders, soups and soup squares, biscuits, piping jellies, thick fruit squashes, liquid eggs, and also certain toilet preparations.

It must be borne in mind, however, that Gelozone is not a satisfactory substitute for animal gelatine in the manufacture of table jellies or other articles where a clear cutting jelly is required. This is due to the fact that Gelozone produces an opaque mucilage rather than a transparent jelly. When Gelozone was first put on the market it was found to possess a faint odour of seaweed, but this has now been completely eradicated and all grades are odourless and tasteless. The manufacturers will be pleased to send samples to any reader of THE CHEMICAL AGE who would like to experiment with this new product.

## Chemical Matters in Parliament

### Oil Fuel Hydrogenation

IN the House of Commons, on February 22, Mr. W. Leonard (Glasgow, St. Rollox) asked the First Lord of the Admiralty if he could state the total quantity of oil produced from British coal ordered by the Admiralty for the coming 12 months; and what was the contract price for such oil?

Mr. T. B. Martin (Durham, Blaydon) also asked the First Lord of the Admiralty what quantity of oil produced from British coal was recently ordered by his Department, and at what cost?

In reply Sir B. Eyres Monsell said it would be contrary to the established practice to disclose details of the quantity and price of oil purchased by the Admiralty.

Mr. Leonard: Are the conditions of this purchase economical as against mineral oil?

Sir B. Eyres Monsell: I am answering a question on that subject later.

Mr. Martin then asked the First Lord of the Admiralty whether the order recently given for oil produced from British coal by the low temperature carbonisation process was given as a result of experiments having proved that this method of producing oil suitable for consumption in His Majesty's ships was superior to any other method; whether the Admiralty considered buying oil produced by any hydrogenation process; and, if so, what were the comparative costs of oil produced by the two processes?

Sir B. Eyres Monsell: No. The order referred to was placed because an acceptable oil was offered in bulk at a price we were willing to pay in view of our desire to help this new venture. No such offer of oil produced by hydrogenation has yet been made.

Mr. Martin: The right hon. Gentleman says no such offer

has yet been made. Is that because the hydrogenation has not reached a stage where they can make it a commercial success or is it because the Admiralty has not yet decided to encourage hydrogenation?

Sir B. Eyres Monsell: This is a very elaborate and difficult question. We are willing to take as much oil as we can get at a reasonable price from low temperature carbonisation, but the hydrogenation processes are far more expensive. We are experimenting with them, but at present we should not be able to buy at any reasonable price from any process of hydrogenation that I know of as yet.

Mr. Leonard: I take it that the price is such as to constitute a subsidy on the process.

Sir B. Eyres Monsell: No I should not call it a subsidy. We are very ready always to help anything in the direction that would be of tremendous value to the country and the coal-mining industry and, if we pay a little more, I am quite ready to defend that.

Mr. Leonard: Then it is not an economical price as compared with mineral oil.

In a further question Mr. G. Hall (Merthyr Tydfil, Aberdare) asked whether the Admiralty had entered into a contract for a fixed period at a fixed price for the oil or was it just small portions of oil as they were delivered by the companies.

Sir B. Eyres Monsell: No, we have entered into a contract for a year for so many tons per month. It is not desirable to say how much we pay.

## Society of Glass Technology

### A Study of Volatilisation Losses from Glass

THE application of statistical methods to the quality control of manufactured products was the subject of a paper by Mr. Bernard B. Dudding, read before the Society of Glass Technology at its meeting in Sheffield on February 15. Mr. Dudding said that a recent paper by Dr. Egon Pearson read before the Royal Statistical Society made his own paper somewhat redundant. The Glass Standards Committee of the Society, however, had been engaged in some experimental work on the thermal endurance of rods of a commercial glass, and had suggested that the data obtained in that work might form the basis of a paper on statistical methods. His paper described the construction of graphical control charts like those introduced by Shewhart, suited to the study of the results from routine testing on small sample batches selected from manufactured products. An alternative method due to Fisher, for testing the consistency of results more suited to isolated experiments, was also described.

In a second paper, volatilisation losses from glasses containing potash and silica were dealt with by Mr. E. Preston, and Professor W. E. S. Turner. These glasses were prepared by melting in platinum and were found to be difficult to prepare and preserve. Whilst being much more viscous than the corresponding soda glasses, they were of very inferior durability, and could only be preserved in dry  $\text{CO}_2$ -free air; very high silica glasses, with 90, 85 and 80 per cent. of  $\text{SiO}_2$ , however, were quite durable. Volatilisation losses determined at  $1,400^\circ$  and  $1,300^\circ$  showed that, whilst no sharp separation into two groups of glasses occurred, as with the soda-silica series, nevertheless evidence was not lacking that the compounds potassium-quad-silicate,  $\text{K}_2\text{O} \cdot 4\text{SiO}_2$ , and potassium disilicate, the  $\text{K}_2\text{O} \cdot 2\text{SiO}_2$ , had existence in the molten state at these temperatures. The volatilisation losses for the whole series suggested an unknown but presumably extensive dissociation of the quad-silicate in liquid solution. The variation of the temperature coefficient of volatilisation from  $1,400^\circ$  to  $1,300^\circ$  seemed capable of explanation in the light of the equilibrium diagram for this two component system when the two compounds were assumed to be present in the melt, the disilicate having a temperature coefficient approximately only half that of the quad-silicate. Comparison of the initial rates of loss with those of the soda-silica series showed that below 30 per cent. approximately, of either alkali, the ratio of the loss of potash to the loss of soda was less than the ratio of the respective molecular weights, viz., 1:1.51, but above about 30 per cent. of alkali the ratio of the losses was greater than the ratio of the molecular weights.

## Letters to the Editor

### Papers on Thermo-chemistry

SIR.—The Federal Council for Chemistry has received a communication from the Union Internationale de Chimie sending a copy of a report of the Committee on Thermo-chemistry and stating that it is proposed to publish an International Table of Thermo-chemical Data. The Union asks for publicity to be given to the request of the secretary of the committee that authors who have published papers on thermo-chemistry within the last five years should send him two copies of their papers. Such copies should be sent to Dr. L. J. P. Keffler, The University, Liverpool.—Yours faithfully,

S. E. CARR,  
Assistant Secretary.  
Federal Council for Chemistry.

Burlington House,  
Piccadilly, W.1.

### Chemists and the Next War

SIR.—I have read with great interest Mr. Corr's letter in THE CHEMICAL AGE of February 25 (page 161) in regard to chemists in the next war. Suggestions of a similar nature have been made in the past, but they have never been followed up. A proposal along analogous lines was submitted to the Technical Committee on Chemical and Bacterial Warfare at Geneva, of which I was a member, at its meetings last November, and I cannot do better than quote an extract from the Committee's report (Ref. No. Cone. 152):—

"Third suggestion (which did not meet with the unanimous approval of the Drafting Committee).—Several members of the Committee thought that a kind of stigma involving the prohibition to practise their profession might be attached to those engaging in work aimed at the preparation of chemical or bacteriological warfare. As regards chemistry in particular, a "society of chemists" might be constituted in each country on the model of the medical associations or law societies which already exist in certain countries. All chemists should compulsorily belong to this society. Among the professional rules would be the prohibition to prepare for war by means of poisonous substances, and those failing to observe this rule would be expelled from the society, the reason for the expulsion being made public. The Special Committee noted that this was a suggestion on which it was very difficult to form an opinion, and that it raised a number of moral, political and administrative questions which did not come within the Committee's province and were, moreover, interconnected with the general question of supervision."

The suggestion was made in one of the discussions that the matter should be referred to the League Committee on Intellectual Co-operation, but I have no knowledge as to whether this is being done or not.—Yours faithfully,

J. DAVIDSON PRATT.

166 Piccadilly,  
London, W.1.

## Tar Oil as Diesel Engine Fuel

### A New Application for Contact Bodies

At the fifth technical session of the Verein für die Bergbaulichen Interessen, held at Essen, Dr. Broche reported on investigations concerning the uses of coal tar products carried out at the Chemical Research Laboratory of Zeche Mathias-Stinnes. In the course of these investigations, a method was discovered of using tar oil instead of gas oil in Diesel engines. It is based on the fact that oxidising catalysts, e.g., vanadium pentoxide, thorium oxide, or platinum, possess the property of lowering the ignition point of tar oil to that of gas oil. When provided with special contact bodies, Diesel engines, according to the report, run equally well on tar oil as on gas oil. The contact bodies, which glow under the influence of the tar oil spray, are arranged in the antechamber of the engine at a certain distance from the fuel nozzle. It is possible to equip existing Diesel engines with these contact bodies and thereby to change them over to tar oil operation.

## The Institute of Chemistry

### Fifty-Fifth Annual Meeting

At the fifty-fifth annual general meeting of the Institute of Chemistry held in the Hall of the Institute, Russell Square, on March 1, the Meldola Medal was presented to Dr. Leslie E. Sutton, of Oxford, and the Sir Edward Frankland Medal and Prize to Mr. Leslie Young, of the Royal College of Science.

The President, Dr. G. C. Clayton, M.P., in moving the adoption of the report, remarked on the steady growth in membership, the sound financial position, and the increasing activity of the Institute. The Institute had received suggestions in which might be detected a measure of kindly criticism of chemists and technical men, especially such as aspire to positions of responsibility in industrial undertakings. For positions of control, science alone did not suffice the chemist, like anybody else, must acquire much knowledge and experience and become endowed with those not less important qualities of character, judgment and tact, which responsibility entails. Not only competition, but discovery and invention, together with modern methods in administration and management, had contributed to the existence of conditions which were bewildering to economists and financiers. These difficulties were not new: they were only presented in a more acute form than even when mechanisation of industry first started. It was for chemists to put our old industries in the most favourable position to meet competition, and even more to branch out into new lines, especially new industries, which, by giving employment, would absorb some of those displaced by world competition in many of the heavy industries.

Professor Jocelyn F. Thorpe, F.R.S., was elected president in succession to Dr. Clayton. Other elections were as follows:—Vice-Presidents: W. J. A. Butterfield, G. C. Clayton, M.P., A. E. Dunstan, F. G. Edmed, G. G. Henderson and W. H. Roberts; hon. treasurer: P. H. Kirkcaldy.

## Fine Chemical Industry

### Expiry of Wages Agreement

THE national agreement between the Drug and Fine Chemical Manufacturers' Association and Chemical Workers' Union regulating the wages and conditions of 20,000 men and women expired on February 28. A statement issued by the Union says that "no agreement is likely to be reached and signed between the parties for some time yet," and that factory stewards and committees have been instructed to advise members of the Union that they are expected to resist all attempted changes by immediate withdrawal of labour. On February 15 the Union received from the employers their replies to the Union's counter-proposals, to which the Union Executive have replied intimating non-acceptance and requesting further consideration, intimating that, until Union members have had an opportunity to vote on the employers' terms, no agreement can be entered into, and that any attempted variation of hitherto wages, conditions, or practices by employers, prior to another agreement being reached and signed between the parties, will be resolutely resisted.

### New Autumn Colour Cards

THREE new colour cards embodying autumn colours of the British Colour Council, with recipes for dyeing silk, cotton and wool, have been issued by Imperial Chemical Industries, Ltd. In the case of the wool colours combinations are given in two columns: one chosen for their excellent levelling power and their very good fastness to light, whilst the other represents substantially cheaper matchings of service where low cost of dyeing is a prime consideration. For the silk colours the selection of the dyestuffs has been made with the object of facilitating the production of even dyeing on viscose of varying quality; in the case of acetate silk the material has been dyed with the addition of a little Turkey Red oil in the manner described in the I.C.I. pattern card on "Duranol and Dispersol Colours"; whilst tin-weighted silk has been dyed with the addition of Glauber's salts.

## International Superphosphate Trade

Statistics for 1930 and 1931

DETAILS of superphosphate production and consumption for 1930 and 1931 are given in "Superphosphate," February, 1933. The total world production for 1931 at 10,986,397 tons, compared with 15,584,662 tons, the revised figure for 1930, shows a reduction of 4,598,265 tons, or say 29.5 per cent. The smaller reduction was in Africa, about 4,500 tons or slightly over 14 per cent., and the greatest reduction actually in Europe (about 2,416,500 tons) and in percentage in Asia (Japan) 47 per cent. Europe's percentage reduction was below the average at 26.5 per cent., whilst America was in excess of the average, 39 per cent.

The tonnage of phosphoric acid represented by the superphosphate production is estimated at 1,815,140 tons, as compared with 2,571,050 tons, the estimated phosphoric acid content of the 1930 production.

It is evident that the interchange trade suffered a very material reduction in 1931 as compared with 1930 when the total quantity exported was returned at 1,185,555 tons; the reduction in 1931 was, therefore, 189,067 tons, or 16 per cent. Interchange trade, however, did not decline *pro rata* with the consumption; in other words, the exporting countries maintained more than their *pro rata* share of the trade. Consumption of superphosphate was substantially in excess of production, the relative totals being 11,633,231 tons in 1931, and 14,700,151 in 1930, a reduction in 1931 of 3,075,920 tons in consumption as compared with a fall in production of 4,598,264 tons. Stocks in manufacturers' hands were therefore reduced by 646,833 tons during the year, whereas during 1930 stocks were increased by 875,511 tons. It is of interest to observe that taking the two years 1930 and 1931 together, production and consumption practically balanced each other, thus:—

|       |     | Production<br>(tons). | Consumption<br>(tons). |
|-------|-----|-----------------------|------------------------|
| 1930  | ... | 15,584,662            | 14,700,151             |
| 1931  | ... | 10,986,397            | 11,633,231             |
| Total | ... | 26,571,059            | 26,342,382             |

In commenting upon the 1930 statistics, it is pointed out that the deliveries of phosphate rock had obviously been in excess of the consumption and that it was accordingly to be expected that the 1931 deliveries would show a more marked falling off than would the superphosphate production. According to the details furnished by the phosphate mining companies, deliveries in 1931 were 6,732,906 tons as compared with 11,066,045 tons in 1930, a reduction of 4,363,049 tons, or 39 per cent. As already noted, the world superphosphate production in 1931 fell by 4,598,264 tons, or 29.5 per cent., so that the forecast was borne out by the event, for if the reduction in phosphate rock deliveries had only been commensurate with the fall in superphosphate production they would have attained 7,722,000 tons.

## High Pressure Steam Plant

Investigations on Preventing Corrosion

IN the operation of high-pressure steam-power plants much difficulty is experienced on account of embrittlement of the boiler plates; scale formation on the heating tubes; corrosion in the boiler, economisers and superheaters; and deposits on the turbine blades. Methods of preventing the first of these difficulties have been worked out and put into industrial practice as a result of research in the Chemical Engineering Division of the University of Illinois. Further research toward the correction of the other evils has been in progress for the last three years. This has involved a fundamental study of the solubility of the various salts present in boiler waters, both separately and combined, at steam pressures up to 3,200 lb. per sq. in. ( $373^{\circ}$  C.). A small laboratory boiler capable of operating at this higher pressure is also in operation, making actual tests involving the formation and prevention of scale. Tests are also being conducted in industrial plants for the correlation of the results of this research for the prevention of scale, as well as corrosion, with actual operation.

## Overseas Manufacturing

Problems on the Establishment of a Factory

CONDITIONS of overseas trade which led to the necessity of many British manufacturers establishing factories in foreign countries were remarked upon by Mr. F. H. Peck in the course of a lecture delivered to the Hull Chemical and Engineering Society on February 21. South America was taken as an example, the most striking increase in local manufacturing activities being quoted as having taken place in the State of Sao Paulo, Brazil.

The numerous commercial and technical inquiries necessary to a full investigation of the possibilities of profitably manufacturing in the country of choice were outlined by the lecturer. A diagrammatic lantern slide showed these items being received by the various specialist departments of a large manufacturing concern at home and used by these departments in the preparation of estimated manufacturing costs, buildings cost, factory personnel, etc., and in the planning of the factory and formation of a subsidiary overseas company. The next phase dealt with was the work of arranging the building contract in the country of choice, and many details in connection with this important step were enlarged upon. The estimated time for completion of the building work was depicted diagrammatically by a progress line with the many items of plant and machinery joining the progress line in orderly sequence at pre-determined dates coincident with certain stages of the constructional work. It was shown how, by means of photographs and reports, the parent company was kept in touch with the progress made.

### Engineers' Accountancy System

The necessity of keeping such ledgers and books relating to first costs as would facilitate the setting up of the new company's ledgers was stressed and by means of lantern slides the engineers' accountancy system was explained. Management problems in connection with the starting up and running of the factory were then dealt with, and by means of graphs and diagrams, efforts in training national labour of mixed nationalities were demonstrated. Production efficiencies and waste packing and raw materials also received attention and the results of special efforts made over a number of years to reduce waste were shown. Works statistics of production, work in process in all departments, packed stock and waste were then dealt with, together with a progressive system of recording same in such a manner as to permit of errors and faults being located and immediately rectified. The paper concluded by explaining pay sheets and the method of dissecting same for costing purposes.

## Trade with Malaya

Commercial Museum Planned for Singapore

THE interest aroused in Malaya by the Empire Products Exhibition, held in Singapore in May, 1932, has led to the attempt to organise a permanent commercial museum in the city. According to information forwarded by the United States Trade Commissioner in Singapore, quarters have been secured in the heart of Singapore's business district and it is understood that a number of British firms already have signified their intention of exhibiting. The museum probably will be opened early this year. It is hoped to make exhibits as complete as possible and to supply information relative to sources of manufacture, local distributors, prices, and other matters. Orders will be booked and passed on to importers, thus saving the middleman's profit. A trade journal, the "Empire Trade Indicator," giving advertisements and explanatory notes regarding the exhibits, will be distributed free of charge to buyers in the British Empire.

### Cosach Commission restarts Nitrate Mines

THE Cosach Liquidation Commission, at a conference attended by Senor Allessandri, President of Chile, has decided to restart work in a certain number of undertakings at Tarapaca, Antofagasta and Taltal. Work will be provided for a large number of unemployed. It is believed that the stocks of nitrates will decrease considerably as the result of the Government's policy.

## News from the Allied Industries

### Matches

A CIRCULAR FROM THE BOARD, sent out to the shareholders of United Match Industries, Ltd., urges them to use all possible influence to obtain relief for the industry "from its present unfair burden." What is necessary, it is stated, is an increase in the import duty. This would remove, the circular says, "the inequality that now exists; the British match manufacturer pays, in addition to the excise duty, an import duty on his raw materials, whereas the completed match made abroad escapes this duty, and would provide further revenue for the Treasury."

### Brewing

NEGOTIATIONS ARE BEING ACTIVELY CONDUCTED between Sir John Ellerman, the principle shareholder and chairman of Hoare and Co., and the directors of another leading London brewery. A qualified offer has now been made for the control of Hoares. There is reason to believe that there are two purchasers competing for the control of Hoares. Both are large London brewery companies, who envisage a considerable increase in profits if the barrelage consumed by the houses controlled by Hoares and their own circuit can be produced in one centre.

### Soap

IT IS UNDERSTOOD that freehold works covering a site area of about 4 acres in Derby Road, Farnworth, Widnes, formerly known as the Mill and Hargreave's Works, and later as the Farnworth Pith and Size Works, have been purchased for development as a soap works. This is good news for Widnes, especially in view of the recent closing of Gossage's works. Among the directors of the new concern are Dr. J. H. Wigner, Mr. R. Bloomer, and Mr. E. M. Wright, all of whom were for many years with Gossages, and Mr. M. W. Hardwick, who is connected with the Granox Soap Co. Mr. F. J. Poole, chairman of Fodens, Ltd., is the chairman of the new company. The new company has been registered as the Widnes Soap Co., and is a private concern. The share capital is £20,000 in £1 ordinary shares.

### Insecticides

AFTER A LAPSE OF ONE YEAR, the ordinary shares of Cooper, McDougall and Robertson, Ltd., manufacturers of sheep and cattle dip, are restored to the dividend list, the directors recommending a distribution of 2½ per cent., less tax. Handicapped by factors beyond the control of the company, including adverse movements of exchanges in many of the principal markets, political unrest and industrial depression, profits fell sharply in 1931. Since then numerous economies have been effected, while the loss on remittances from abroad was reduced during the twelve months ended September 30 last, and a smaller reserve is required to cover the decreased value of liquid assets in countries where local currency can only be exchanged into sterling at a loss or under restriction. Mainly as a result of these developments, the directors are able to report that net earnings have risen from £84,265 to £109,013.

### Sugar

DURING THE LAST FEW WEEKS the ordinary £1 shares of Tate and Lyle, Ltd., have risen from 56s. to 67s., on reports that the company was negotiating for the absorption of other businesses. In this connection home-grown beet sugar factories have been mentioned. It is reported that Mr. G. Vernon Tate informed a representative of "The Financial News" that friendly relations had been maintained with competitive interests and that recently both sides had taken amicable consultations with the object of ending undue competition. The company's four refineries last year supplied 58½ per cent. of the country's sugar requirements. Two other refineries, in which it is interested, supplied a further 5 per cent. The subsidy under which the company's chief competitors—the home-grown beet sugar factories—are operating has always been, not unnaturally, a subject of complaint. Any move towards closer organisation will have much to commend it. The Government's position, however, may call for reconsideration.

## Chemical Notes from Overseas

### German Lamp Black

AN OFFER HAS BEEN MADE by the Gold-und Silbersscheideanstalt, of Frankfort-on-the-Main to the firm of August Wegelin, A.G., of Kalscheuren, which was Germany's second largest lamp black producer and now insolvent. The Scheideanstalt, a dominating factor in the German precious metals trade and controller of various important chemical enterprises, made an offer for acquisition of the Wegelin concern; predicated upon the latter's capital being reduced on the basis of 20 to 1, from £124,400 (at par) to £6,220 (at par); increasing the capital to £25,000 (at par) by the difference of £18,750 (at par) of fresh capital to be furnished by it; and the liquidation of the insolvent firm's debts on the basis of 30 per cent. In addition, the Scheideanstalt would also purchase any shares of stock of old stockholders, after the capital reorganisation, at par value.

### Phosphorus to be Produced in Italy

PHOSPHORUS production by the Societa Anonima Fosfero e Derivate was recently inaugurated at Spoleto. During the war the white phosphorus needs of the Italian Government were supplied from the plant at Monterotondo, which was put up and operated on French capital. This plant was dismantled after the armistice. In the meantime an Italian company had constructed a plant in Civitavecchia in 1918. At the close of the war the Civitavecchia plant engaged in the production of red phosphorus and phosphorus sesquisulphide, supplying the Italian State Match Monopoly. This plant was finally closed down in 1928, after which the Government approached the Italian Match Consortium with the suggestion that the consortium form a company and erect a phosphorus plant with Government support. The inauguration of the plant at Spoleto represents the realisation of this programme. The Woehler process with certain adaptations is used for the production of white phosphorus. Red phosphorus and phosphorus sesquisulphide are also manufactured at Spoleto the latter from the direct combination of white phosphorus and sulphur by a process perfected some years ago in Japan by a Scandinavian group. The capacity of the plant in red phosphorus and phosphorus sesquisulphide is considerably greater than the peace time needs of Italian consumption and preparations are being made to export these products. Zinc phosphide and calcium phosphide will also be made.

### South African Eucalyptus Oil Manufacture

IN THE NEAR FUTURE the manufacture of oil from eucalyptus trees may be carried on extensively in South Africa, for the Union has many extensive eucalyptus plantations. Some of the timber is felled for various purposes, but no attempt has been made to extract the valuable oils in the foliage. A good deal of rich foliage is also obtained when the forests are cleared of coppice growth, and all this waste material could be used to provide oil. The necessary investigations have been initiated by the Chief Conservator of Forests and the Director of Native Agriculture, who carried out investigations to discover how such oils would compare with Australian oils, and what the general yield and quality would be. The first investigations were made in Natal and from many other parts of the Union and submitted to careful test. In this way it has been possible to test all varieties of leaves and to determine the geographic influence upon quality, and an official report on the investigation was published. According to the report, a good yield of excellent quality oils can be produced, comparing favourably with oils produced from corresponding Australian species. However, because of an over-production of eucalyptus oil the market price is at present very low. South Africa has only one small establishment producing eucalyptus oils, and some of these oils are being used by the mines in their oil flotation processes, and more such oils could be made for local consumption. In an average year South Africa imports nearly 3,000 gallons of eucalyptus, mostly from Australia.

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THE Goldsmiths' Company has presented £12,500 to increase the endowment of the Goldsmiths' professorship of metallurgy. The original offer of £10,000 has been increased to the larger sum in view of the fall in rates of interest.

## Weekly Prices of British Chemical Products

### Review of Current Market Conditions

THE following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

THE volume of business placed during the current week has been on the whole satisfactory with markets continuing firm and with very little change. Sales of sulphate of ammonia for export continue satisfactory. In the home market deliveries of sulphate continue on an increasing scale, and the demand will be particularly brisk as soon as the farmers can get on to the land again. All crops will be in need of a nitrogenous fertiliser after the check they have received during the recent vigorous weather. For early spring a top-dressing of sulphate is generally preferred and wheat growers are expected to require supplies at once. As nitro-chalk is a granular fertiliser containing nitrogen in both ammoniacal and nitrate forms, it is a suitable top-dressing for all crops and grassland. The fact that it contains 48 per cent. of calcium carbonate makes it particularly useful on soils inclined to be acid. The concentrated complete fertilisers contain about twice the amount of plant food present in ordinary compound manures based on superphosphate. Farmers are appreciating more the special virtues of these products. No. 1 is most suitable for early potatoes, sugar-beet and mangolds, No. 2 for maincrop potatoes, beet and mangolds on light land, No. 4 for cereals, No. 5 for cabbages and green crops and Nos. 6 and 7 for turnips, swedes, peas and beans, etc.

There is continued steadiness on the Manchester chemical market so far as the vast majority of materials are concerned, and cases of actual weakness are few and far between. Buying interest, however, shows little improvement compared with the level of recent weeks. Deliveries against existing commitments are not unsatisfactory, but most traders during the past week report relatively few new bookings of any consequence. An unaltered position is reported in the Scottish Market although a fair number of home inquiries are being received. The following price changes have been reported since the publication of the complete list of prices in THE CHEMICAL AGE of January 28 (pp. 84-85).

#### General Chemicals

**ACID, CITRIC.**—LONDON : 10d. per lb., less 5%. MANCHESTER : 9½d. to 9¾d.  
**ANTIMONY OXIDE.**—SCOTLAND : Spot, £24 per ton, c.i.f. U.K. ports.  
**ARSENIC.**—LONDON : £22 14s. c.i.f. main U.K. ports for imported material; Cornish nominal, £23 f.o.r. mines. SCOTLAND : White powdered, £27 ex wharf; spot, £27 10s. ex store. MANCHESTER : White powdered Cornish, £23 at mines.  
**CARBON TETRACHLORIDE.**—£42 to £47 per ton, drums extra.  
**LEAD ACETATE.**—LONDON : White, £34 per ton; brown, £1 per ton less. SCOTLAND : White crystals, £34 to £36; brown, £1 per ton less. MANCHESTER : White, £32; brown, £31.  
**NICKEL AMMONIUM SULPHATE.**—£53 per ton d/d.  
**NICKEL SULPHATE.**—£53 per ton d/d.  
**POTASSIUM CHLORATE.**—3½d. per lb. ex wharf London in 1-cwt. kegs, LONDON : £37 to £40 per ton. SCOTLAND : 9½/100% powder, £37. MANCHESTER : £37 to £38.  
**SODIUM PRUSSIATE.**—LONDON : 5d. to 5½d. per lb. SCOTLAND : 5d. to 5½d. ex store. MANCHESTER : 4½d. to 5d.  
**SULPHUR.**—£12 per ton. SCOTLAND : Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.  
**VERMILION.**—Pale or deep, 4s. 5d. to 4s. 9d. per lb.

#### Coal Tar Products

**ACID, CARBOLIC.**—Crystals, 9d. to 11d. per lb.; crude, 60's, 1s. 11d. to 2s. per gal.; 2% water, 3s. 0d. MANCHESTER : Crystals, 9½d. to 9¾d. per lb.; crude, 2s. 4d. per gal. SCOTLAND : 60's, 1s. 7d. to 1s. 8d.  
**ACID, CRESYLIC.**—99 100%, 11d. to 1s. 8d. per gal.; pale 95%, 11d. to 11½d.; dark, 10d. to 1s. 3d., all according to specification; refined, 1s. 8d. to 1s. 9d. LONDON : 98 100%, 1s. 3d.; dark, 95 97%, 11d. SCOTLAND : Pale 99/100%, 1s. 3d. to 1s. 4d.; 97 99%, 1s. to 1s. 1d.; dark 97 99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.  
**ANTHRAZENE OIL.**—Strained, 4½d. per gal.  
**NAPHTHA.**—Solvent 90/160%, 9d. to 1s. 2d. per gal.; 95/160%, 1s. 7d. to 1s. 8d.; 90/160%, 1s. 1d. to 1s. 2d. LONDON : Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0d. f.o.r. SCOTLAND : 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.  
**PITCH.**—Medium soft, £4 15s. per ton. MANCHESTER : £4 10s. to £4 15s. f.o.b. LONDON : £4 10s. to £4 12s. 6d. f.o.b. East Coast port.

**REFINED COAL TAR.**—SCOTLAND : 4½d. to 5d. per gal.

**XYLOL.**—Common, 1s. 11d. to 2s. per gal.; pure, 2s. to 2s. 2d.  
**TOLUOL.**—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 3d.

#### Nitrogen Fertilisers

**SULPHATE OF AMMONIA.**—Export, £5 15s. per ton f.o.b. U.K. ports in single bags; home, £6 10s. per ton, delivered in 6-ton lots to consumer's nearest station.  
**NITRATE OF SODA.**—£8 16s. per ton, delivered in 6-ton lots to consumer's nearest station.  
**CYANAMIDE.**—£7 per ton, delivered in 6-ton lots to consumer's nearest station.  
**NITRO-CHALK.**—£7 5s. per ton, delivered in 6-ton lots to consumer's nearest station.  
**CENTRATED COMPLETE FERTILISERS.**—£10 12s. 6d. to £11 per ton according to percentage of constituents as follows:—

#### PERCENTAGE OF CONSTITUENTS.

|       | Nitrogen. | Phosphoric Acid.<br>Water Soluble. | Insol. | Potash. | Price<br>per Ton. |
|-------|-----------|------------------------------------|--------|---------|-------------------|
| No. 1 | 12.5      | 12.5                               | —      | 15.0    | 10 14 0           |
| No. 2 | 10.4      | 10.4                               | —      | 20.8    | 10 16 0           |
| No. 4 | 10.4      | 20.8                               | —      | 10.4    | 10 12 6           |
| No. 5 | 8.0       | 16.0                               | 5.5    | 16.0    | 10 9 6            |
| No. 6 | 7.5       | 26.0                               | 6.0    | 7.5     | 12 0 0            |
| No. 7 | 6.5       | 22.5                               | 3.0    | 13.0    | 10 12 6           |

The above prices are for delivery to farmer's nearest station in 6-ton lots packed in 1 cwt. bags supplied free by the sellers.

#### Borax Consolidated, Ltd.

##### Profits Maintained despite Abnormal Conditions

Speaking at the thirty-fifth ordinary general meeting of Borax Consolidated, Ltd., in London on February 22, the Earl of Leven and Melville (chairman), said that the net profits, at £200,787, showed an increase of £12,537 as compared with those of the previous year. Actually, the trading profit was about the same, the additional profit being due to profit on investments sold and to a small increase in the interest on investments and of interest on debentures and dividends on shares of subsidiary companies. The year's profit was made on a reduced tonnage of borax and boric acid sold, and from March last on a reduced price for these products in the United States. The conditions there were abnormal; there had been an enormous reduction in the demand for practically all products, with consequent over-production, and a fall in prices in many instances to below cost. This had had effect on their own particular industry: some of their industrial consumers were working to a small percentage of their normal output, and in some cases they were, for the time being, shut down. To the present date they had seen in the United States but little sign of recovery for their business, whilst in some European countries it had been difficult to carry on business owing to restrictions on remittances. These conditions were common to many industries at the present time, and they could only hope that a general levelling-up of prices and freedom of exchange might soon take place. In the meantime, by further reduction of cost prices and effecting all possible economies, they were endeavouring to meet the situation

#### Potentialities of the Potash Enterprise

Referring to the importance of the investment made through their American subsidiary in the United States Potash Co., the chairman said that the refinery in New Mexico had been completed, and since the end of September last it had been producing a very high grade of muriate of potash. The process devised by the company's chemists and the plant designed by its engineers, with the assistance of those firms supplying the plant, had been highly successful, not only as to the tonnage produced, which was in excess of estimates, but also as to the grade of the finished muriate and the economical cost of production. Both the crude and refined potash salts were given satisfaction to the fertiliser firms who had contracted for them, and the operations up to date, had fully established the value of the enterprise. With a practically inexhaustible mine of soluble potash ore and the economical production of refined muriate of potash established, the future prosperity of the United States Potash Co. should be ensured.

## Inventions in the Chemical Industry

### Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

#### Aqueous Suspension of Insecticides

AQUEOUS suspensions of powdered insecticides are prepared with the aid of organic amines or quaternary ammonium bases or salts. In examples mixtures of sulphur with steatite, gypsum or kieselguhr, insoluble arsenates or arsenites, Burgundy mixture, Bordeaux mixture, or verdigris, are mixed with one of the above compounds to produce mixtures of improved suspendability. Specific compounds employable are hexadecylamine, di-isobutyl-amine and trimethyl-alkylamino-ethyl-ammonium. (See Specification No. 373,581, of Etablissements et Laboratoires G. Truffaut.)

#### Extraction of Paraffin Wax

IN the separation of wax from hydrocarbon oils by diluting, chilling and filtering or centrifuging, there is used as diluent a non-cyclic halogen-substituted hydrocarbon which is gaseous at ordinary temperature, e.g., methyl chloride, ethyl chloride, or dichloro-difluoromethane, mixed or not with a usual solvent, e.g., benzene, liquid sulphur dioxide, acetone, butanol. In an example, 67 kg. of paraffin distillate is mixed with 33 kg. of ethyl chloride and 3.35 kg. of fuller's earth, cooled to -30° C. and filter-pressed. (See Specification No. 373,538, of Edeleanu-Ges.)

#### Specifications Accepted with Dates of Application

PROCESS AND APPARATUS FOR THE DIRECT PRODUCTION OF PRODUCED GAS FREE FROM TARRY MATTER. J. Van Hemelryck. April 11, 1931. 387,854.  
 PROCESS FOR TREATING THE RESIDUES OBTAINED IN THE CRACKING OF OIL. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 29, 1931. 387,896.  
 PROCESS FOR PRESERVING FIBRES TO AZO DYESTUFFS DEVELOPED FROM THEIR COMPONENTS. Soc. of Chemical Industry in Basle. July 23, 1931. 387,922.  
 MANUFACTURE OF DITHIOCARBAMATES. Deutsche Hydrierwerke Akt.-Ges. June 11, 1932. 387,924.  
 SYNTHETIC RESINS AND METHODS OF MAKING THE SAME. British Thomson-Houston Co., Ltd. July 21, 1931. 387,928.  
 MANUFACTURE OF RESINOUS COMPOSITIONS FROM PHENOLS AND ALDEHYDES. British Thomson-Houston Co., Ltd. July 27, 1931. 387,932.  
 MACHINES FOR KNEADING, MIXING OR OTHERWISE WORKING CRYSTALLISED MARGARINE MASSES AND OTHER SOLID FATS. C. Hildebrandt-Sörensen. Aug. 5, 1931. 387,937.  
 MANUFACTURE OF DYESTUFFS OF THE TRIARYLMETHANE SERIES. I. G. Farbenindustrie. Sept. 12, 1931. 387,956.  
 REFINING OF VEGETABLE AND ANIMAL OILS, FATS, AND WAXES. L. Rosenstein and W. J. Hund. Sept. 22, 1931. 387,962.  
 COMPOSITIONS CONTAINING LITHIUM AND SILICON AND PROCESSES OF PRODUCING THE SAME. H. Osberg. July 4, 1931. 387,727.  
 INDANTHRONE AND ITS DERIVATIVES. E. I. Du Pont de Nemours and Co. May 13, 1930. 388,043.  
 METHODS OF MAKING ARTIFICIAL RESINS. International General Electric Co., Inc. May 15, 1930. 388,030.  
 VAT DYEING. Imperial Chemical Industries, Ltd., W. M. Hamilton and J. S. Wilson. July 17, 1931. 388,044.  
 STAIN-RESISTING ALLOYS. Electro Metallurgical Co. Dec. 18, 1930. 388,057.  
 TREATMENT OF WATER EMPLOYED IN BOILERS, EVAPORATORS AND OTHER SYSTEMS, FOR THE PURPOSE OF PREVENTING SCALE FORMATION. W. McDonald. Aug. 4, 1931. 388,045.  
 INTRODUCTION OF CHEMICALLY ACTIVE SUBSTANCES INTO VACUUM TUBES. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. Nov. 18, 1930. 388,046.  
 PROCESS FOR THE MANUFACTURE OF CRYSTALLISED HYDRATES OF SODIUM METASILICATES. J. Crosfield and Sons, Ltd. (Philadelphia Quartz Co. of California, Ltd.). Aug. 15, 1931. 388,041.  
 PROCESS FOR THE MANUFACTURE OF ARSENIC COMPOUNDS. A. Carpmael. (I. G. Farbenindustrie). Aug. 17, 1931. 388,054.  
 MANUFACTURE OF PRINTING INKS. Imperial Chemical Industries, Ltd. S. Horrobin, and A. Stewart. Aug. 19, 1931. 388,072.  
 MANUFACTURE OF QUINOLINE DERIVATIVES. J. J. V. Armstrong (T. van Schelven). Aug. 25, 1931. 388,087.  
 MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS OF THE ANTHRAQUINONE SERIES. J. Y. Johnson (I. G. Farbenindustrie). Sept. 7, 1931. 388,096.  
 CATALYTIC CONVERSION OF HYDROCARBONS. Houdry Process Corporation. Jan. 30, 1931. 388,189.

PRODUCTION OF HYDROCARBONS OF LOW BOILING POINT BY THE THERMAL DECOMPOSITION OF HYDROCARBON OILS. J. Y. Johnson. (I. G. Farbenindustrie). Oct. 19, 1931. 388,114.  
 DESTRUCTIVE HYDROGENATION, CRACKING, AND SIMILAR HEAT TREATMENT OF CARBOXYLIC MATERIALS. Chemical Reactions, Ltd. (Deutsche Gold und Silber-Scheideanstalt vorm. Roessler). Jan. 1, 1932. 388,171.  
 PROCESS FOR SENSITISING SILVER HALIDE EMULSIONS. I. G. Farbenindustrie. Feb. 19, 1931. 388,204.  
 METHOD OF STORING DRY CARBON DIOXIDE ICE. P. Schlumberger. Feb. 25, 1932. 388,212.  
 PROCESS OF MAKING MOTOR FUEL BY CRACKING OILS. Gulf Refining Co. April 15, 1931. 388,225.  
 MANUFACTURE OF ARTIFICIAL TEXTILES, ARTIFICIAL STRAW, TUBES, STRIPS, AND THE LIKE. Lonza Elektricitätswerke und Chemische Fabriken Akt.-Ges. June 27, 1931. 388,277.  
 MANUFACTURE OF CELLULOSE ESTERS. Kodak, Ltd. July 28, 1931. 388,303.  
 PLASTIC COMPOSITIONS. Carbide and Carbon Chemicals Corporation. Aug. 10, 1931. 388,309.  
 MANUFACTURE OF AZO DYESTUFFS CONTAINING COPPER. I. G. Farbenindustrie. Sept. 28, 1931. 388,332.

#### Applications for Patents

AUSTENITIC ALLOYS. G. S. Bell and W. T. Bell. Feb. 24. 5684.  
 PREPARATION OF SUBSTITUTED PHENYLACTONITRILES. Boot's Pure Drug Co., A. T. P. Easson and H. A. Stevenson. Feb. 23. 5580.  
 MAKING NEUTRAL SODIUM PYROPHOSPHATE. Chemische Fabrik J. A. Benckiser Ges. Feb. 24. (Germany, May 9, '32.) 5751.  
 CASTING READILY OXIDISABLE METALS. Dow Chemical Co. Feb. Chemical Co. Feb. 24. (United States, March 3, '32.) 5661.  
 DIBENZANTHRONE VAT DYESTUFFS. E. I. Du Pont de Nemours and Co. and A. J. Wuertz. Feb. 22. (Feb. 12, '32.) 5376.  
 MANUFACTURE OF COLLOIDAL SULPHUR. E. I. Du Pont de Nemours and Co. Feb. 22. (United States, Feb. 23, '32.) 5422.  
 MANUFACTURE OF NITRO-ARSANILIC ACID. D. Gardner. Feb. 21. 5287.  
 PURIFYING ORGANIC ACID CHLORIDES. W. W. Groves (Monsanto Chemical Works). Feb. 21. 5305.  
 BASIC ESTERS OF FATTY AROMATIC ACIDS, ETC. F. Hoffman-La Roche and Co., Akt.-Ges. Feb. 24. (Germany, March 22, '32.) 5670.  
 MANUFACTURE OF WATER-INSOLUBLE AZO DYESTUFFS, ETC. I. G. Farbenindustrie. Feb. 20. (Germany, Feb. 18, '32.) 5201, 5202, 5203, 5204, 5205, 5206.  
 ANTI-HALATION LAYERS FOR PHOTOGRAPHIC PLATES, ETC. I. G. Farbenindustrie. Feb. 21. (Germany, Feb. 24, '32.) 5306.  
 MANUFACTURE OF AMINO-ATHRAQUINONE SULPHO-CHLORIDES. I. G. Farbenindustrie. Feb. 22. (Germany, Feb. 22, '32.) 5430.  
 MANUFACTURE OF ANTHRAQUINONE DERIVATIVES. I. G. Farbenindustrie. Feb. 23. (Germany, Feb. 23, '32.) 5556.  
 MANUFACTURE OF TETRAZO COMPOUNDS. I. G. Farbenindustrie. Feb. 24. (Germany, Feb. 24, '32.) 5690.  
 MANUFACTURE OF RUBBER SOLUTIONS, ETC. I. G. Farbenindustrie. Feb. 24. (Germany, Feb. 25, '32.) 5698.  
 MANUFACTURE OF ALKALI METAL HYDROXIDE SOLUTION. I. G. Farbenindustrie. Feb. 25. (Germany, Feb. 25, '32.) 5821.  
 PRODUCTION OF AZO DYESTUFFS. I. G. Farbenindustrie. Feb. 25. (Germany, May 6, '32.) 5828.  
 DYESTUFF INTERMEDIATES, ETC. Imperial Chemical Industries, Ltd., and M. Mendoza. Feb. 22. 5480.  
 MANUFACTURE OF INTERMEDIATES. Imperial Chemical Industries, Ltd., and W. A. Sexton. Feb. 24. 5707.  
 MANUFACTURE OF ORGANIC SUBSTANCES OF HIGH MOLECULAR WEIGHT. J. Y. Johnson (I. G. Farbenindustrie). Feb. 24. 5692.  
 MANUFACTURE OF AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID, ETC. J. Y. Johnson (I. G. Farbenindustrie). Feb. 24. 5693.  
 PRODUCTION OF STABLE EMULSIONS OF SULPHUR. J. Y. Johnson (I. G. Farbenindustrie). Feb. 24. 5694.  
 ALKALI STEARATE PASTES. L. Konstantt. Feb. 21. (Germany, Feb. 22, '32.) 5340.  
 PRODUCTION OF ALKALI METAL CARBAMATES. Mathieson Alkali Works. Feb. 24. (United States, March 31, '32). 5738.  
 PRODUCTION OF PRESS-MOULDING MASSES BY CONDENSATION OF PHENOLS WITH FORMALDEHYDE, ETC. Dr. F. Raschig Ges. Feb. 21. (Germany, Feb. 27, '32.) 5347.  
 MANUFACTURE OF CHROMIFEROUS DYESTUFFS. Soc. of Chemical Industry in Basle. Feb. 20. (Switzerland, Feb. 20, '32.) 5181.  
 SEPARATING WAX FROM OIL. Standard Oil Co. Feb. 23. (United States, March 18, '32.) 5567.

## From Week to Week

BRITISH RAYON PRODUCTION in January was 5,930,000 lb., against 5,520,000 lb. in December and 6,440,000 lb. in January, 1932.

OFFICIAL ITALIAN STATISTICS place production of copper sulphate during the first nine months of 1932 at 749,963 quintals (6,675 tons), an increase of 23 per cent, over the same period of 1931.

SIR JOHN CADMAN, chairman of the Anglo-Persian Oil Co., left London for Teheran on March 2. It is hoped that the visit may facilitate a settlement of the dispute between the company and the Persian Government. Meanwhile, the conversations at Geneva are suspended until next May at the earliest.

HOW SYNTHETIC NITRATE INTERFERES with the sale of fertilisers by gas undertakings was explained at the annual meeting of the National Association of Fishery Boards in London on February 23 by Mr. F. H. Heald. Mr. Heald said that in certain cases ammoniacal waste products were now being discharged into drains and streams.

THE PRINCE OF WALES visited the British Industries Fair at Olympia on Tuesday. He was accompanied by Dr. Julio Roca, vice-president of the Argentine Republic, and members of the Argentine Mission now in this country. The first stall visited was that of Imperial Chemical Industries, where the Prince was particularly interested in modern methods of manufacture.

COPPER SULPHATE IS BEING PRODUCED to an increasing extent in India, but imports chiefly from the United Kingdom and Germany account for a large portion of the demand. The chief consumers are the tea and rubber planters. They employ the material in agricultural sprays. Imports during the fiscal year 1931-32 totalled 882 long tons as compared with imports of 1,217 tons in 1929-30.

UNDER THE WILL of Professor Claude Metford Thompson, Park Place, Cardiff, who was Emeritus Professor of Chemistry at the Cardiff College of the University of Wales, £5,000 will go to the university for the purpose of purchasing books and periodicals for a reference library relating to chemistry. Professor Thompson left estate to the value of £27,170, with net personality £27,099.

THE THIRD NUMBER of "Sands, Clays and Minerals," a magazine devoted to economic minerals, has been published by A. L. Curtis. Many of the articles are of interest to those engaged in chemistry and economic mineralogy. Chief among these are "Examination of Minerals by Ultra-Violet Light," by Dr. Julius Grant; "Refractory Cements and Lutes," by W. O. Lake, and "Notes on Tantalum and Niobium," by W. R. Schoeller. The latter deals with the future industrial possibilities of these metals.

THE "POTEEN" MAKERS (illicit distillers) in Ireland have recently taken to the use of sugar beet pulp, which is sold largely in that country as a cattle food, for the making of illicit spirits. It is understood that a quantity of molasses is mixed with the pulp before it leaves the beet sugar factory, in order to make it a palatable cattle food, and it is the molasses which the distillers require. Hitherto it has been exceedingly difficult to obtain molasses in any district in which the Civic Guards suspect illicit distillation. Several prosecutions have been made in connection with the use of beet sugar pulp.

THE ACCELERATED WEATHERING OF PAINTS and varnishes was the subject of a paper by V. G. Jolly, B.Sc., A.I.C., read before a meeting of the Manchester Section of the Society of Chemical Industry held on March 3. The author pointed out that owing to the time taken for natural weathering agencies to break down paint, varnishes and lacquers, it is highly desirable to evolve a reliable accelerated test for checking the durability of standard products and evaluating new ones. A direct method of accelerating the breakdown of such materials is to submit them to artificial weathering agencies such as light and water alone, or in combination, in the order considered most likely to bring about rapid disintegration. An accelerated testing apparatus was described, together with the results obtained.

THE TWELFTH ANNUAL DINNER AND DANCE of the London Section of the British Association of Chemists will be held at the Palace Hotel, Bloomsbury Street, London, W.C.1, on March 11. Applications for tickets, price 8s. 6d. (including gratuities but exclusive of wines) should be made not later than March 7 to the Secretary, British Association of Chemists, 175 Piccadilly, London, W.1. The annual dinner of the Manchester Section will be held at the Engineers' Club, Manchester, on March 15. Tickets (6s.) can be obtained from any member of the committee, or from the hon. secretary, Dr. J. Avery, 55 Polefield Road, Heaton Park, Manchester. The annual meeting of the Liverpool Section will be held on March 29, at the Central Hotel, Widnes. Further information may be obtained from the hon. local secretary, Mr. A. Betton, 3 Woodburn Boulevard, Woodhey, Rock Ferry, Cheshire.

THE GORDON WIGAN PRIZE for chemistry has been awarded to Mr. T. P. Hoar, Sidney Sussex College, for a thesis entitled "On the Mechanism of the Corrosion of Iron and Steel."

SIR RICHARD GREGORY, editor of "Nature," who is now touring India, paid a special visit to the Bose Research Institute at Calcutta, and was shown by Sir J. C. Bose the various departments where advanced research work was being carried out. A meeting was also held in his honour in the Institute.

DR. FREDERICK C. WOOD, of Manchester, has withdrawn his acceptance of the headship of the Chemistry Department at Hull Municipal Technical College and the Education Committee at its meeting on February 23, appointed Mr. Leonard Balmforth, analytical and research chemist at the Imperial Institute, London, to the post.

TWO FORMER RUBBER PLANTATIONS in British Malaya are reported to be growing ipecac root instead of rubber. The plantings were begun with seedlings obtained from the local government experiment station. While the cultivation in this territory is difficult, about three years being required before the shrub is fully grown, it is said that the plantings are progressing favourably.

THE OVERSEAS DEPARTMENT of the Japanese Government has granted a permit to the South Manchuria Railway Co. to establish an ammonium sulphate plant at Dairen. The name of the company is to be the Manchurian Industrial Chemical Co., Ltd., or the Manchu Kwangaku Kogyo, K.K., with a capital of 25,000 yen (£2,500,000) paid in half by the South Manchuria Railway Co., and the other half to be offered for general subscription to the public.

THE GOVERNMENT OF THE IRISH FREE STATE is shortly to set up an Economic Council which will regulate the number of factories operating in any particular branch of industry. This will affect chemical manufacturers in Ireland to some extent, but as it is understood something of a Five Year Plan is being attempted there is still room for more factories in the Free State. The particular need at the moment, it is stated, are fine chemicals and medicinal preparations which are, at the present time only being manufactured in comparatively small quantities.

THE "Soc. An. Fabbrica di Acqua Ossigenata e Derivati (F.A.O.D.)," of Italy, has been proposed for a Brambilla prize for the production of concentrated hydrogen peroxide, potassium persulphate, ammonium persulphate, sodium perborate and magnesium peroxide. This company initiated the studies and production of electrolytic hydrogen peroxide in 1925 in the Linate works. Prior to that electrolytic hydrogen peroxide was entirely imported. The production of the F.A.O.D. in hydrogen peroxide (100 volumes) rose from 30 tons in 1926 to 590 tons in 1931. The excellent results given by the electrolytic process has made it possible to reduce the price from 17 lire to 6 lire per kilo.

THE IRISH FREE STATE MINISTER for Industry and Commerce issued an Order on March 1 making that date the appointed day on which the Control of Manufacturers Act, 1932, should come into force. From that date manufacturing businesses which are not in the beneficial ownership of nationals of the Irish Free State to an extent exceeding one-half of the capital may no longer be carried on, unless the business was in operation on June 1, 1932, or a new manufacturer's licence has been granted by the Free State Minister for Industry and Commerce. All individuals and companies affected by the Act should take immediate steps to regularise their position and in cases where a licence is required application should be made at once to the Secretary, Department of Industry and Commerce, Lord Edward Street, Dublin.

LORD RUTHERFORD, in a lecture on the "Detection and Production of Swift Particles," at the Royal Institution on February 25, said that for five years work had been done on charged particles at high speed with the aim of bombarding matter and transmuting it. For that reason it had been justly said that the men who were working with these high-speed particles were the modern alchemists. The general method was to "speed up" charged particles in highly exhausted vacua by means of an accelerating potential. In the United States an entirely novel form of generator, needing no transformer or rectifier, was in course of construction, and efforts were being made to reach a potential of 10,000,000 volts. Particles had not only to be speeded up; they had to be detected. He demonstrated four methods by which charged particles could be detected and counted. Their kicks on a string electrometer could be photographed; they could be heard through a loud-speaker as a persistent patter like machine-gun fire on a small scale; they could be detected by flashes of light in a thyratron, one for every particle; and they could be counted by the revolutions of a cyclometer.

### Obituary

JOHN W. WILSON, of the Yorkshire Dyeing and Proofing Co., Middleton, on February 26, at Alderley Edge. Aged 47.

## Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

**Canada.**—The representative of a Montreal firm engaged in the sale of mill supplies, industrial tools, and aeronautical supplies, is at present on a business visit to the United Kingdom, and is desirous of negotiating agencies for the sale of special equipment and materials for the pulp and paper industry, the mining industry, the electrical manufacturing industry and the silk and artificial silk industry. Agencies will be operated on a commission basis, and will cover the whole Dominion. (Reference No. 316.)

**Denmark.**—A commission agent established at Copenhagen wishes to obtain representation of United Kingdom exporters of vegetable oils, spices, salt, chemicals (heavy and fine), raw cotton, coal, wool, hemp, and jute, on a commission basis. Correspondence may be in English. (Reference No. 328.)

**France.**—A firm of agents established at Paris wishes to obtain the representation of United Kingdom exporters of nickel and alloys in ingots and manufactured into tubes, wire, etc., wires and plates in all metals, material for metallurgical and chemical industries and for public works, on a commission basis. (Ref. No. 330.)

## Forthcoming Events

- Mar. 6.**—Royal Society of Arts, "Welding and Allied Processes for Engineering Purposes," Arthur Stephenson, 8 p.m. John Street, Adelphi, London.
- Mar. 6.**—Society of Chemical Industry. Joint Meeting of the London Section and Plastics Group, "Plastics, with Special Reference to Cellulose Materials," Dr. W. J. Jenkins, 8 p.m. Burlington House, London.
- Mar. 7.**—Business Research and Management Association of Great Britain, "Organisation as a Science," L. Urwick, 6.45 p.m. Anderton's Hotel, Fleet Street, London.
- Mar. 7.**—Institution of Automobile Engineers. Joint Meeting of several societies, "Some Notes and Observations on Petrol and Diesel Engines," H. R. Ricardo, 7.30 p.m. Royal Geographical Society, Kensington Gore, London.
- Mar. 7.**—Hull Chemical and Engineering Society, "The Nature and Reproduction of Sound," W. F. Wyatt, Grey Street, Park Street, Hull.
- Mar. 7.**—Royal Institution, "The Analysis of Crystal Structure by X-Rays," Sir William Bragg, 5.15 p.m. 21 Albemarle Street, London.
- Mar. 7.**—Institution of Petroleum Technologists, "The Migration of Oil and Natural Gas," Professor V. C. Illing, 5.30 p.m. Royal Society of Arts, London.
- Mar. 8.**—Society of Dyers and Colourists (Midlands Section), "Simple Apparatus and Tests for Efficient Control of Water Softeners, etc." Leicester.
- Mar. 8.**—Institute of Fuel, "The Preparation of Coal for the Market," Dr. D. T. Davies, 6 p.m. Burlington House, Piccadilly, London.
- Mar. 8.**—Institute of Metals, Annual General Meeting, 10 a.m., Hall of the Institution of Mechanical Engineers, Storey's Gate, London. Annual Dinner and Dance, 7 p.m. Trocadero Restaurant, London.
- Mar. 8.**—Institute of Fuel (North-Western Section), "The Use of Refractories in the Fuel Industries," Colin Presswood, 7 p.m. Engineers' Club, Albert Square, Manchester.
- Mar. 8.**—The Television Society, "Some Aspects of Television Reception," T. H. Bridgwater, London.
- Mar. 8.**—Royal Society of Arts, "Recent Developments in the Warming and Ventilation of Buildings," J. L. Musgrave, 8 p.m. John Street, Adelphi, London.
- Mar. 9.**—Oil and Colour Chemists' Association, "Petroleum as a Source of Paint Materials," C. I. Kelly, 7.30 p.m. 30 Russell Square, London.
- Mar. 9.**—Institute of Metals, Annual General Meeting (continued), 10 a.m. Storey's Gate, London.
- Mar. 10.**—Chemical and Allied Industries North East Coast Dinner, 7.30 p.m. Royal Station Hotel, Newcastle-on-Tyne.
- Mar. 10.**—Society of Dyers and Colourists (London Section), "Colour Discrimination," W. O. D. Pearce.
- Mar. 10.**—Institute of Fuel (North-Western Section), "The Design and Operation of Industrial Furnaces, using Gas, Oil and Electricity," S. N. Brayshaw, 7 p.m. Engineers' Club, Albert Square, Manchester.
- Mar. 11.**—British Association of Chemists (London Section), Annual Dinner and Dance, 6.30 p.m. Palace Hotel, London.
- Mar. 11.**—International Society of Leather Trades' Chemists (British Section), "A Contribution to the Study of the Estimation of Fat and Water Solubles in Leather. Part IV," Dr. A. Colin Rees, "A Laboratory Method of Stripping Vegetable Tanned Leather," R. F. Innes, "Notes on the Causes and Prevention of Deterioration of Leather in Storage," R. F. Innes, 10 a.m. Leather Industries' Department, the University, Leeds.

## Company News

**Staveley Coal & Iron Co., Ltd.**—An interim dividend of 2½ per cent., tax free, the same as a year ago, is announced.

**Snia Viscosa.**—A net profit is reported for the year 1932, of Lire 22,305,640. The dividend is again 6 per cent.

**Amalgamated Zinc (de Bavay's).**—For the six months ended December 31 last a dividend at the rate of 5 per cent. per annum is payable on April 7.

**Calico Printers' Association.**—An interim dividend on the preference stock at the rate of 5 per cent. per annum, less tax, is payable on March 31.

**North Broken Hill, Ltd.**—It is announced that in consequence of the continued low price of metals the directors are unable to declare a dividend for the quarter ending March 31, 1933. For the previous quarter 1s. per share was paid.

**Reckitt & Sons, Ltd.**—The quarterly dividend and interest on the ½ per cent. and 5 per cent. preference shares and 4 per cent. and 4½ per cent. debenture stocks will be paid on April 1 to holders registered on March 4.

**Viscose Development Co.**—The net profit for the year 1932 was £3,985, against £5,025 in the previous year. The directors recommend a dividend of 6 per cent. (less tax) on the preference shares, placing to reserve £1,000, to reserve for tax £200, and carrying forward £317. The annual meeting will be held on February 28, at Winchester House, London, at 12 noon.

**Solidol Chemical Co.**—A net loss is reported for the year to September 30, 1932, after charging management, administration and distribution expenses and directors' fees, of £3,844, to which is added the debit brought forward of £1,032, giving a debit to be carried forward of £4,876. The annual meeting will be held in the Hall of Incorporated Accountants' and Auditors' Society, Victoria Embankment, London, on March 6, at 11.30 a.m.

**Cooper, McDougall & Robertson, Ltd.**—A dividend of 2½ per cent. is announced on the ordinary shares. The previous payment of a dividend was in the year 1930 when 7 per cent. for the twelve months to September 30, 1930, was distributed. During the past year the profit on trading, interest, etc., less loss on exchange and exchange reserve adjustment, amounted to £130,501, against £112,846 in the previous twelve months. The general reserve is increased by £25,000 to £179,000 and the balance carried forward is £51,069. The annual meeting will be held at Winchester House, London, on March 10, at 12 noon.

**Yorkshire Indigo, Scarlet and Colour Dyers.**—After providing for depreciation of dyehouses, leasehold property, plant and machinery and all other charges, the trading for the year 1932 resulted in a loss of £3,828, to which is added interest on debenture stock, making £8,342, less credit balance brought forward of £146, leaving a debit of £8,196. The directors have transferred the balance of reserve fund £3,000 and investment reserve £752, leaving a deficiency of £4,444 to be carried forward. The annual meeting will be held at Atlas Chambers, King Street, Leeds, on March 10, at 12 noon.

**John Oakey & Sons.**—The report for the year 1932 states that the net profits, including £7,132 brought forward, amount to £44,237. A dividend of 6 per cent. has been paid to the preference shareholders and an interim of 2½ per cent. to the ordinary shareholders. The board recommends a final dividend of 8½ per cent., less tax, to the ordinary shareholders, making 11 per cent. for the year, a dividend of 11 per cent., less tax on the employees shares, the transfer of £5,000 to general reserve, leaving £5,424 to be carried forward. The annual meeting will be held at Winchester House, London, on March 9, at 12.30 p.m.

## Bradford Dyers' Association

### Increased Trade Offset by Lower Prices

The annual meeting of the Bradford Dyers' Association, Ltd., was held at Bradford on February 28, Sir Thomas Robinson (vice-chairman) presiding in the absence, through illness, of the chairman, Mr. George Douglas, whose speech was read to the meeting.

In his report Mr. Douglas said the directors had to present an unsatisfactory trading account. Total trade increased compared with 1931, but was offset by lower prices owing to competition, domestic and foreign. In the cotton trade the effect of the weavers' dispute had persisted throughout the year. Competition from Japan had intensified in cotton and artificial silk. In the wool section an increase in the early part of the year had not been maintained. The payment for dyewares was more than £50,000 in excess of 1931 prices. While an increase was inevitable on the imported dyestuffs owing to the effect of exchange of the departure from the gold standard the industry had to suffer a 10 per cent. tariff which the board considered was an unnecessary charge. They felt as strongly as ever on the action of the dyestuffs manufacturers of Great Britain in advancing their prices when in every other section of the industry wages were being reduced, prices lowered, and profits disappearing. The American company had suffered in common with other textile concerns in the United States, but it had shown much better in the last few months, and there was a reasonable chance of considerably improved results.

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